PRESENTED
26 JUN 1946

SESSION

1943 - 1944

SECOND SERIES :

Volume 2, Part IV.

PROCEEDINGS AND REPORTS

of the

BELFAST NATURAL HISTORY and PHILOSOPHICAL SOCIETY

PRICE - - TWO SHILLINGS

Frontispiece.

Photo : A. Harold Bastin.

One of the oldest Beech trees at Burnham Beeches.
Known popularly as "The Elephant."

Photo : Dr. G. Fogerty.

Wind-clipped Whitethorn, Coast of Co. Clare.
(See Transpiration, p. 141.)

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of the

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY

Second Series: Volume 2, Part IV.

SESSION - - 1943-1944

EDITED BY ARTHUR DEANE,
HON. SECRETARY

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BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY

[ESTABLISHED 1821.]

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The membership of the Society consists of Shareholders, Annual Subscribers and Honorary Members.

Shareholders holding more than two shares are not liable for an annual subscription, but shareholders of two shares pay an annual subscription of five shillings, and holders of one pay ten shillings.

In 1914 a new class of membership was created including persons of either sex, to be elected under the bye-laws of the Society, and admitted by the Council on payment of ten shillings per annum. Such members have all the privileges of the Society, and take part in any business of the Society not affecting the ownership of the property. In 1917 an Archaeological Section was founded. Persons wishing to join the Section must be members of the Society and pay an additional minimum subscription of five shillings per annum.

A general meeting of Shareholders and Members is held annually to receive the Report of the Council and the Statement of Accounts for the preceding year ending 31st October, to elect members of Council, to replace those retiring by rotation or for other reasons and to transact any other business incidental to an Annual Meeting.

The Council elect from among their own number the President and other officers of the Society.

Each member has the right of personal attendance at the ordinary lectures of the Society, and the privilege of introducing two friends for admission to such.

Any further information required may be obtained from the Hon. Secretary, at 7 College Square North, Belfast.

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BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

Founded 5th June, 1821.

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To be filled up by the Candidate

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[Please write name in full.]

Description .....

Residence .....

.....

..... being desirous of becoming a Member of the Society, I, the undersigned Member, recommend.....as a suitable candidate for election.

Dated this.....day of....., 19.....

Signature of Member .....

[Candidates must be known to the Member signing this form.]
[*All applications are subject to the approval of the Council.*]

Received .....

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20th November, 1943.

S. W. Allworthy, M.A., M.D., M.R.I.A., President, in the Chair.

THE INDUSTRIAL TOWN—AN ANALYSIS OF ITS GROWTH WITH SUGGESTIONS FOR ITS FUTURE DEVELOPMENT.

Denis Winston, M.A., B.Arch.
Chief Architect, Ministry of Health and Local Government, N.I.

That familiarity breeds contempt is a true though trite saying. Many of us have grown so accustomed to our towns as they are to-day that we are inclined to accept their squalor, ugliness and noise as if these were natural and necessary, as if dirt and muddle were just inevitable parts of the machinery of life. It is well to remind ourselves, therefore, that the conglomerations of ugliness and inconvenience which we call Manchester, Liverpool, Birmingham and Belfast are new and very exceptional phenomena, for it is only during the last 150 years that these unhappy growths have developed.

For 5,000 years, men have gathered together in cities for convenience and comfort and so that they could develop the arts and sciences, build the universities and art galleries, cathedrals and concert halls, and enjoy all those good things of life which only become possible through communal effort. It was the industrial revolution of the last century that created the new and horrible spectacle of thousands upon thousands of people crowded into rows of cheerless and insanitary dwellings packed at 50, 60 and even 80 to the acre between mills and shipyards, abattoirs and railway stations. This is a highly exceptional and unnatural phenomenon which we can only accept if we are content to sink back into the barbarism from which we have climbed so painfully.

Civilization is difficult to attain and even more difficult to maintain. Fine buildings do not in themselves make civilization, but no period of high culture has been content with mean and squalid surroundings. Whether it is Greeks or Romans or 17th Century Frenchmen, we judge them by the evidence of the towns they built, and history confirms this evidence as true.

Examining the typical industrial town of to-day we find that London and Liverpool, Dublin and Belfast, Boston and San Francisco all show the same lively business and administrative centres: here are the best shops, the civic buildings, the good hotels and theatres, this is the best and brightest part of the town where whatever of life and art there is, is concentrated and, although there is congestion and soot and tawdry ugliness, it is tolerable because of its vitality.

A step beyond the narrow confines of this beating heart of our typical town the vigour and life disappear, leaving only a squalid and ugly ring of mixed business and industrial premises interspersed with old and insanitary slums which are often subdivided houses, once fashionable homes, now huddling incongruously

in the shadow of hideous railway stations or giant gasometers. In this zone everything is second rate and obsolescent, tramcars groan through the streets and the smoke-laden sky appears through a network of overhead wires.

Travelling away from the centre through this dreary wilderness where only the public houses are bright, there occurs at some point a perceptible change, sheer chaos gives way to a more organised sordidness, streets are straighter, the interminable rows of houses are better built. This is the area built towards the end of the last century when fear of the cholera epidemics which swept the slums brought an elementary control over building developments; thus it is far more sanitary but yet it remains perhaps the most depressing of all areas in the town: unrelieved alike by the vestiges of 18th century urbanity or the heroic ugliness of railway stations, workhouses and factories which enliven the inner ring, the heart sinks at the utter deadness of it all and the thought of how solid and difficult to move it would be.

Towards the outside of our town we gradually return to something more cheerful; first the roads begin to twist and turn again, not by accident this time but according to the laws of the picturesque which also govern the layout of the large mansions and their grounds which stand mostly deserted, their owners having fled ever further afield before the remorseless flood of bricks and mortar. The little houses which now surround these older homes, and often grow in the very grounds themselves, have hedges and tiny plots of their own and their architecture strives at all costs to be "quaint." Eventually the gardens get larger, the garages more universal, and we are in a semi-detached Neo-Tudor world built almost entirely since the last war, the speculative builder's answer to the instinctive desire of ordinary humanity for a "home of their own." This is the outermost ring of all which recaptures something of the visible prosperity of the centre but exchanges its frank vulgarity for a smug 20th Century bad taste.

Perhaps I should have said that this "was" the outermost ring of all for it is rapidly ceasing to be so. To-day, the Local Authorities, deciding at last to improve the lot of the slum dweller, are humorously enough leaping over the heads of shop-keepers, doctors and lawyers and placing bewildered dockers and manual workers in the outlying country among a startled aristocracy of merchants and mill-owners.

But the most unfortunate feature of these edges of our towns is that there is no clean finish to them but, along every radial road, the houses straggle far into the country, sometimes even joining completely one town with the next. By a strange anomaly the main roads, which should be above all free channels for the movement of traffic, thus attract throughout all their length the most lively development: it is along the main road that we see the first of the jerry-villas that herald the approaching town, next come the public houses and cinemas of the suburbs, and soon we are in a continuous linear shopping centre, or rather a series of centres strung loosely together on the thread of the road, which thus concentrates the maximum amount of slow and stopping traffic, and pedestrian cross-traffic, in the path of cars and lorries which should be moving quickly along it.

Just as the "natural" growth of the unplanned town has resulted in a typical pattern, so the application of planning principles to the awkward problem of this illogical pattern is leading to an equally typical solution. This is a satisfactory indication of the high measure of agreement that has been reached, and it is significant that this agreement has been arrived at by planners working

separately and often out of touch with each other. An examination of recent proposals for towns of the kind under consideration show that there are about half a dozen main principles on which there appears to be general agreement, and which control the main lines of suggested reconstruction and development.

The following are some of the most important of these principles:—

I. Control of Haphazard Growth by means of an Agricultural Green Belt.

The over-centralisation of the last hundred years which has made, for example, Greater London the home of over a quarter of the entire population of the United Kingdom, is now seen to be equally disastrous from the point of view of health, convenience, efficiency and economy; City Councillors are beginning to understand that it is better to make their cities clean and healthy than ever larger in area and population. The aim, therefore, is the compact city easily accessible to unspoiled country ,and the land round the town, now a blighted area of hoardings, petrol stations and scattered bungalows which lies in a state of suspended animation as the fields ripen for "development," is therefore scheduled as a Green Belt and reclaimed permanently for agriculture.

II. Co-ordination of Traffic and Transport Systems.

Main Roads and Railways are visualised as parts of an intergrated web of communications linked to each other and to Shipping and Airway Terminals. These arteries along which the life and business of a country flow must obviously be designed for modern high speed traffic; junctions must be controlled, level-crossings eliminated and no buildings allowed to front on to them. No amount of regulations, Belisha beacons or pedestrian crossings can be expected seriously to reduce the appalling numbers of road accidents by which in Great Britain during five years of war more people have suffered injury than in all the air raids. The only practicable solution to this problem is the physical separation of through traffic from local traffic. The shopping street, which is also a main traffic artery, is one of the most dangerous creations ever devised by man and, so long as such exist, we must expect the continuance of this modern version of the slaughter of the innocents.

III. Segregation of Industry.

Efficiency for industry and amenity in the residential areas both demand that the haphazard scattering of industrial undertakings in between the houses and shops should give way to planned industrial zones related to trunk roads, railways, canals and harbours, and properly served with light, power and water. Upon examination, it will be found that most existing industries can be classified in two categories. A certain proportion, such as works that have a close connection with shipping and port facilities or with mining industries, or those heavy industries which depend on enormous capital equipment, will be found to be for all practical purposes immovable. Their position in the town has resulted from real needs, and the planner therefore will try and make these existing groupings the nuclei for larger industrial concentrations. A high proportion of industrial undertakings, however, will be found to have no logical reason behind their siting. The efficiency of many of them will, in fact, be reduced through congestion and lack of room for proper expansion, and these industries should be gradually removed to more suitable sites as occasion arises.

In addition to existing industry, there are new industries to consider. Most of these are likely to be of the "lighter" type, depending on electric power

and road transport. They are, therefore, much more mobile. Some of them should be moved completely away to the smaller towns which suffer from lack of industrial development. Others could be sited on new industrial estates conveniently located in relation to Local Authority housing schemes.

IV. Provision of Public Open Spaces.

Perhaps the most obvious need in the industrial town is more open space to let in the fresh air and sunshine; parks and playgrounds for rest and exercise, grass and trees to relieve the harshness of brick walls and concrete pavements. The chaotic jumble of the industrial town results in many odd plots and waste lands, and in between the dense development on either side of the main radial roads there are often strips of open space which penetrate almost to the centre of the built-up area. These spaces are being used by planners as parkways, combining recreational and amenity with traffic functions; the old ribbon-built roads are by-passed and new arteries follow these wedges of green to the centre.

V. Decentralisation.

The size of the modern city makes it impossible for most of its inhabitants to come to the city centre except occasionally, and under present arrangements—or lack of arrangements—most of the people live in vast wildernesses of houses with no opportunity for social, political, cultural or recreational activities, except those provided by an occasional public house or cinema. One of the aims of modern planning is therefore to subdivide the city area into a number of self-contained communities, each with its local civic sense and civic centre and with its own shops, amusements, parks, schools, hospitals and playgrounds. The boundaries of such an area would generally be the main traffic arteries with their insulating barriers of parkway. Many cities, of which London is perhaps the best example, include within their limits a number of one-time villages, now submerged in the main flood of development, but retaining vestiges of their independence in the local post office and groups of shops. Planners are naturally using such original centres as nuclei for new neighbourhood communities.

VI. Preservation of Natural Features and Monuments of Historic or Artistic Interest.

In the approach to his problem, the modern planner is far removed from the Romans who levelled mountains to get their roads straight, or the French who made mountains to improve the landscape where none were before; so far has feeling swung in the other direction that the name of the great Haussman, who drove those magnificent boulevards through 19th Century Paris, is now used as a term of reproach. To-day the planner's concern is not to impose his will upon the landscape, to sweep away or level and make straight; he tries above all to preserve whatever of good there is and to base development upon observed natural tendencies, seeking out the lie of the land to find the route of his roads and bringing every existing good building, every fine view, every group of trees into his scheme. He knows that each place has its own special character, its own traditions on which much of its interest and vitality depend, beautiful or historic monuments are therefore preserved and improved by the surrounding layout so that in many cases the ordinary citizen notices them for the first time; in the same way natural features, hills, streams, woodlands, sea fronts and so on become the basic elements round which new developments are planned.

These, then, are some of the more important guiding principles which are now generally accepted by those engaged in tackling the physical problems of our industrial towns. In recent months I have seen the preliminary plans for the redevelopment of some of the badly " blitzed " English cities, and it is encouraging and reassuring to find that on Clydebank and in Coventry, in Plymouth and in London, the main principles and objectives behind the plans are the same as those which have been arrived at here in Belfast by Members of the Northern Ireland Planning Commission who are just completing their outline proposals for the Belfast area.

There is then no doubt in the minds of technicians as to what should be done. They have a clear vision based upon actual research and, although no one will underestimate the difficulties to be surmounted before this vision can be realised, it is important to understand that these difficulties are not primarily physical. This war has shown the power of modern man to accomplish far harder physical tasks than the mere widening of a street or the rebuilding of a slum. If we want the job done, it can be done just as we are doing the war job, that is, through work and sacrifice. It is strange that it has always been easier to demand and get sacrifices for the bloody and destructive work of war than for the joyful and creative tasks of peace. It remains to be seen whether this time we shall go forward to meet the tasks of peace with the same determination that we have met the trials of war. The planners, the architects, the engineers, the builders are ready; but it is you, the citizens, who must ensure that they get the chance to turn their plans into reality.

18th December, 1943.

S. W. Allworthy, M.A., M.D., M.R.I.A., President, in the Chair.

OBSESSIONS.

Rev. W. L. Northridge, M.A., B.D., M.Th., Ph.D.

The obsessional neurosis manifests an extraordinary variety of symptoms. Many of these are so unusual as to cause the afflicted person to believe that his mind has become seriously deranged. But in the majority of cases these symptoms can be eradicated by analysis and re-education.

The symptoms can be arranged conveniently as follows:

First, there are obsessional *actions*—" Compulsions " as they are technically called. This means that the patient feels compelled to perform actions that are quite irrational as well as unnecessary. He is aware of how stupid the actions are but feels that unless he performs them something dreadful will happen. Crossing and recrossing the street until it is done the " perfect time," touching various objects in a room or along the road, attending most meticulously to a particular routine after getting up each morning, occupying the same seat in the home or in church and travelling by exactly the same tram or bus to business (not because the person believes in order and punctuality but because he feels that failure to do so will have serious consequences) and above all else excessive hand-washing—these are amongst the most familiar examples of obsessional actions.

Second, there are obsessional *inhibitions*—feelings of inability to do the ordinary thing. Thus a schoolboy found that there were certain letters of the alphabet that he could not write without getting into a panic in doing so but he could not tell why; there is the inability to wear certain articles of clothing more than once or twice; the hesitation about cooking and serving a meal in case it would do some harm, and in some cases inability to speak lest the wrong thing would be said and harm inadvertently be done.

Third, there are *phobias* of various kinds that can make life most miserable. These underlie and explain many of the compulsions and inhibitions just referred to. A phobia is a fear for which there is no real basis. Many phobias are connected with Anxiety States but the obsessional neurosis throws up phobias that as a rule are easily distinguishable from all others. Fear of *contamination*, for example, or of *microbes* is one of the most common of obsessional phobias. These phobias account for inability to wear clothes or cook meals, the patient feeling that somehow the things are not clean. The hand-washing ritual is an endeavour to get rid of a sense of pollution. I quote from the letter of a brilliant university student afflicted in this way: " The tortures through which the fear of microbes

drove me were endless. It was ever present, never a moment away. It made me mould my life into the most unnatural pattern. It drove me to all sorts of queer actions. The agony of planning out every day with avoidance of microbes was more than I could stand. The fear made me develop a most meticulous tidiness. I think that I would have almost gone out of my mind if a stray object had been introduced to my room or if even a match box had been placed in another angle from the one I had placed it in. I washed my hands continually. I was afraid even of my finger nails and would not allow my one hand to touch the other."

A phobia about *doing some harm* to others is very common as an obsessional symptom. It may take many forms. Thus there is the fear of injuring someone, who is particularly loved, by a knife or razor, the fear of spreading contamination or of having a bad influence over others or of " putting a spell over them " so that they cannot speak, the fear of having injured people in accidents without knowing it, of being responsible for accidents the reports of which appear in the press, and the fear of retaining or misusing other people's money—these are common obsessions. One peculiar fear that affected a lady was that she might hide others away in the bodies of animals. She felt how absurd such a thought was but could not help it.

Obsessions may take the form of *doubt* and the inability to decide things for oneself. Typical are cases in which it is almost impossible to re-assure oneself that all lights are out, doors closed, etc., before one retires to bed or leaves one's office. One person used to hold a vessel under the tap for quite a while to assure himself that there was no dripping from the tap. Doubts as to whether a letter has been posted is very common. Here is another paragraph from the letter from which I have already quoted: " When in ——— I wanted very much to return home. But I feared that I might do something that would prevent it, as, for example, give offence to my parents. I imagined that without knowing it I might write something in a letter that would offend them. From that time I lost all confidence that what I was writing was what I meant to write. I therefore reduced my letters to a minimum length, changed my handwriting into the plainest I could write, spent hours writing ten to twenty copies of each letter and a similar number of envelopes because the fear had seized me that I may not be writing the proper address and that, as a result, they would think I had not written at all. When I had finally picked up one letter I would spend up to two hours reading it through with my finger under each word in an effort to convince myself that I had written what I meant to write. Then came the posting, the effort to realise that I had actually posted the letter and the walking up and down in front of the letter-box for as long sometimes as an hour and a half."

What patients speak of as *evil thoughts* are common forms of the obsessional neurosis especially in people who are intensely religious. These are of a type so " horrible " as to make the person imagine that he has committed some " unforgiveable sin." Actually the person's total personality is opposed to the particular thoughts. They are, therefore, in no sense evil. In fact no one except the most saintly-minded could be affected in this particular way.

Obsessions usually indicate the presence of *repressed fear or guilt* or both. The symptoms as a rule symbolise the nature of the repressed material. Excessive tidiness with anxiety attached is a compensatory reaction to a disordered

or disturbed mind; hand-washing is clearly a suitable atoning ritual for unconscious guilt. The guilt, of course, may not be connected with any deliberate wrong-doing. It may arise through misunderstanding of adolescent feelings, but is commonly rooted in a guilt complex. The fear of injuring people is often the sign of repressed aggression. But in every case individual analysis is necessary since similar symptoms may, in different people, have different meanings. There is no lasting cure for obsessions short of thorough analysis.

But much help comes to patients by being assured that their condition is not "mental." There is usually some dread of this and to allay such fears is itself a wonderful relief to these sufferers. Another point is that obsessions cannot be weakened or destroyed by will effort. It is wrong advice to urge people to fight their feelings. The more this is done the stronger the obsession becomes and the more hopeless becomes the patient's plight. *The way of understanding* is the only way to relief and health.

The following publications by Dr. Northridge may be of interest to members.—Ed.

Modern Theories of the Unconscious (now out of print).
Psychology and Evangelistic Preaching.
The Old Testament To-day.
Psychology and Pastoral Practice.

4th December, 1943.

Dr. S. W. Allworthy, M.A., M.R.I.A., President, in the Chair.

"WILD WINGS."

Eric Hosking, F.R.P.S.

Slides.

[No Abstract.]

1st January, 1944.

Dr. S. W. Allworthy, M.A., M.R.I.A., President, in the Chair.

"STONES AND BUILDERS."

J. E. Barton, M.A., Hon. A.R.I.B.A.

Slides.

[No Abstract.]

22nd January, 1944.

Dr. S. W. Allworthy, M.A., M.R.I.A., President, in the Chair.

"A PROBLEM FOR THE BALKANS."

Ann Bridge (Lady O'Malley).

[No Abstract.]

4th March, 1944.

S. W. Allworthy, M.A., M.D., M.R.I.A., President, in the Chair.

THE LIFE HISTORY OF A TREE.

Arthur Deane.

Fig. 1. Young Beech Seedling.

Some people are apt to regard a tree as an inanimate object, but it teems with life, and should rather be compared to an active animal.

It is a living creature, because it feeds, grows and mulitplies; and provides food and protection for its next generation in the form of a seed. Trees, too, are sensitive like animals.

A seed consists of a baby plant (*embryo*) protected by an outer jacket, with a supply of nourishing food to start the young plant upon an active life, until it is able to fend for itself.

Take a Beech tree, for instance. Its seed germinates and gives rise to an independent seedling with its green fan-shaped seed-leaves (*cotyledons*) and young root and shoot. In a short time it will grow into a sapling and finally into a big tree; and as long as it is alive it will continue to grow and increase in thickness (see frontispiece).

Some Wellingtonias (*Sequoia*) of California are the oldest living beings in existence, the trunk reaching a height of over 300 feet and 35 feet in thickness. In the Natural History Museum, South Kensington, there is a cross-section of a trunk 62 feet round with 1,335 annual rings.

Where does all this additional material come from?

It comes from the soil and air.

The tree takes up mineral matter in weak solution from the soil and carbon dioxide from the air, but these substances are not food as the tree cannot be directly nourished from them: they are the raw materials from which the tree manufactures its food in the green laboratories of the leaf.

This green matter is called *chlorophyll* and is the most important chemical substance in the world, as all life depends upon it; and without it there would be no food for anyone. Its power of producing organic material from the outside world is one of the most wonderful chemical processes found in nature.

It will thus be seen that green plants are the producers, whether in the form of wood as in trees, or as potatoes and carrots of the kitchen garden, while animals are not producers but consumers.

It is not necessary that the leaves should appear green externally if the chlorophyll is present. The young copper-beech leaves on the screen still show some chlorophyll but this will eventually become masked by a reddish-brown sap,

and yet the leaves produce food just like ordinary green leaves, because of the presence of chlorophyll.

This masking of chlorophyll should not be confused with the variegated leaves of holly and maple as chlorophyll is absent from the white portions; and consequently those parts cannot take part in the production of food. These variegated leaves should neither be confounded with the autumnal colouring of leaves of deciduous trees when they have ceased their functions, which is purely a biological phenomenon (see page 141).

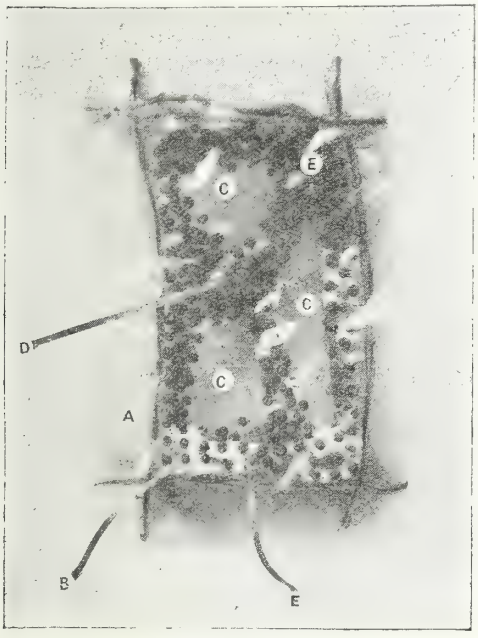


Fig. 2. A typical green plant cell, with portion of neighbouring cell walls. (A) Cell wall enclosing living contents. (B) The protoplasm. (C) Sap vacuoles. (D) Nucleus. (E) Chlorophyll grains or chloroplasts. (From diagrammatic model by A. H. Bastin. Highly magnified.)

The Cell. Let us now examine the contents of one of these chlorophyll-bearing cells. On the outside is a wall composed of a substance called *cellulose*. In the interior of the cell, embedded in a jelly-like substance called *protoplasm*, is a denser protoplasmic body called the *nucleus* and is of the highest importance in the life and control of the cell, and in addition a number of green bodies. These consist of protoplasm, in the meshes of each is the green colouring matter, chlorophyll. These are called *chlorophyll grains* or *chloroplasts*. Then we note three small cavities called vacuoles containing a watery fluid called cell-sap (fig. 2). These sap-vacuoles will increase in size and coalesce to form one large central vacuole and the protoplasm with the chlorophyll grains now line the cell wall.

The Root. As we have seen, the tree besides needing a leafy crown has yet another place to search for its raw materials; it must anchor and bind its roots in the dark soil to obtain from it the necessary water with mineral salts in weak solution, including all the nitrogen it requires. This is obtained from the film of water which adheres around each particle of soil, just as water adheres to a pebble when dipped into a puddle (fig. 3). This is the hygroscopic water and has nothing to do with the free water which is removed by drainage and in which roots could not live. We thus see the importance in the kitchen garden of a fine soil, because the finer the soil, the richer it is in film-water and hence in plant food-making materials. In the tree the dissolved mineral matter is transported by the trunk from the roots to the chlorophyll-bearing leaves.

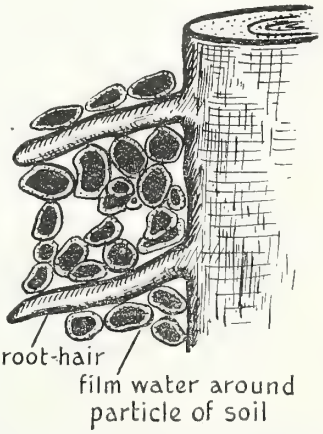


Fig. 3. Portion of root with root-hairs between particles of soil.

Structure of Leaf. If we cut a thin section across the blade of a leaf of the Beech and examine it under the microscope we find that the upper and lower surfaces are covered with a thin skin—the *epidermis*. This usually consists of a single layer of closely packed cells with gaps here and there. Frequently the outer surfaces of some leaves of trees are thickened and covered with a thin layer of wax termed the *cuticle*. This prevents loss of water by evaporation and the surface of the leaves from getting wet. It is often well developed on the leaves of plants growing in sunlight or in dry places; and this further helps to conserve the water-supply in the tree. It often gives a glossy appearance to the leaves of evergreens (fig. 4).

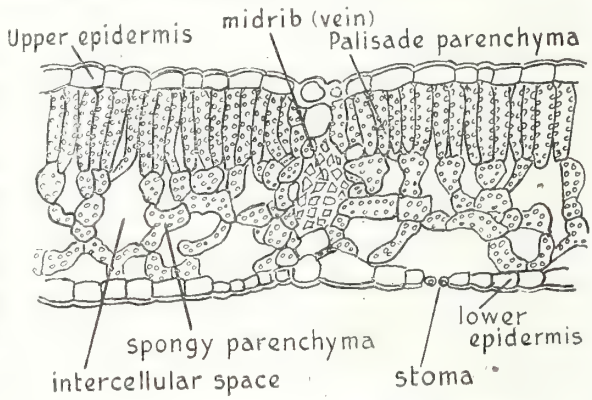


Fig. 4. Cross section through leaf of Beech. Highly magnified.

The gaps in the epidermis are tiny openings called *stomata* (sing. *stoma*) and are usually more abundant on the lower surface and sometimes confined to it in evergreens. The stomata on the leaves or needles of conifers are often made visible to the naked eye by a white waxy deposit around the stoma-bearing part of the epidermis.

Each opening or stoma consists of two curved sausage-shaped cells called *guard cells* with the concave surface towards the aperture and they have the power of opening and closing, as a rule they open under the influence of light and warmth and close when dark and cold, and so they have an important part to play in the control of giving off moisture (fig. 5).

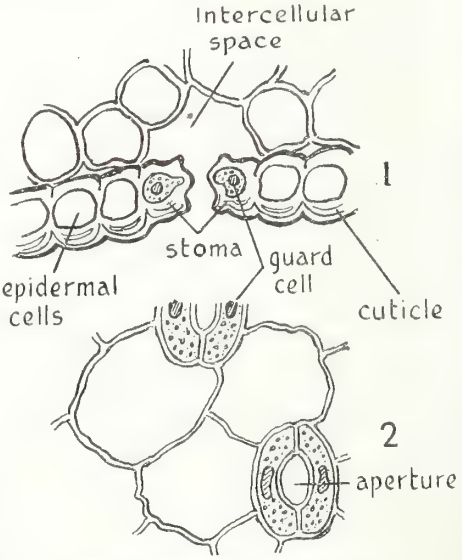


Fig. 5. Epidermis and Stomata.

Between the upper and lower epidermis is a soft tissue termed the *mesophyll* in which are seen here and there the cut veins (*vascular bundles*). These are the parts which resist decay in fallen leaves and form the network of "skeleton leaves."

The mesophyll tissue just underneath the upper epidermis consists of thin-walled cells which stand vertically and closely in contact with each other called the *palisade parenchyma*. Each cell contains protoplasm and is densely filled with chlorophyll grains (*chloroplasts*). Underneath this tissue the cells are irregular in shape with large spaces between them, the intercellular spaces giving the tissue such a spongy appearance that it is called *spongy parenchyma*. It contains protoplasm and a certain number of chlorophyll grains, but its function is more concerned with the intercellular spaces. Such a leaf is characteristic

of flat leaves held out more or less horizontally to the light and which therefore have an upper and lower surface and each tissue is adapted for its special function. In conifers which have rigid needle-like leaves, the tissue arrangement is different but the same principle exists.

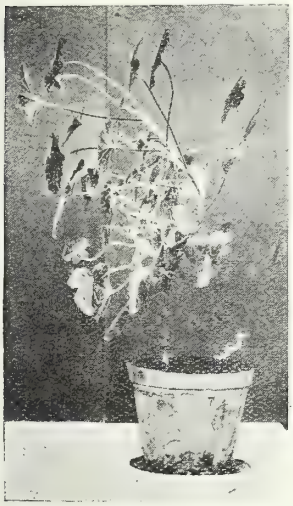


Fig. 6. Pelargonium branches and leaves turned towards source of light on the left.

Functions of the Leaf. It will thus be seen that the leaf is a complex piece of machinery and the leaves are so arranged as to form a leaf mosaic, so that each leaf does not interfere with another, in order that each may catch the rays of sunlight (fig. 6).

White light is made up of seven colours, red, orange, yellow, blue, green, indigo and violet. When the light strikes the millions of chlorophyll grains contained in the cells of the leaves of a tree, the red, orange, yellow, and blue rays of sunlight are held fast by the chlorophyll grains; and the carbon dioxide which exists in the air in small quantities as an impurity, in the presence of water, and a certain temperature is split up in the meshes of each chlorophyll grain resulting in the formation of tiny granules of starch, the valuable oxygen of the carbon dioxide being liberated to enrich the atmosphere. This is called *assimilation* (*photo-synthesis*), the chlorophyll acting as a *catalytic* agent.*

The starch produced forms a basis for all the constructive food used by the tree.

The starch may be used in a soluble form as sugar, or this sugar may combine with nitrogen, phosphorous, sulphur obtained from the soil to form proteid.

Fig. 7. The production of starch in light.

The food produced is sent to where it is wanted in the tree, not necessarily down the stem; it may be up the stem to nourish developing buds or it may be used in the production of new wood† or in the development of roots, flowers and fruits, or it may be stored up as starch in the wood as reserved food for future use.

An interesting experiment proves that chlorophyll is necessary for starch formation. If before sunrise you encase a leaf, still on the tree such as a Sycamore, in tinfoil or black paper, and in which a stencil has been cut; and expose the upper surface of the leaf to bright sunlight. Before sunset remove the leaf, immerse in boiling water to kill it and subsequently place in methylated spirit to extract the chlorophyll. If the leaf is now placed in a solution of iodine all the parts of the leaf exposed to

*A catalytic agent is a substance which influences chemical action without itself undergoing any change in weight or composition.

†For the Structure of Wood, see Deane, A., "Trees: the Characters, Structure and Properties of Wood, with Notes on Forestry and Afforestation." Society's Proceedings, 1918-1919.

sunlight turn dark blue, the test for starch. This shows that starch has been produced in the portions of the leaf exposed to the light and that light is essential for its formation (fig. 7). If a variegated leaf had been used starch would only be manufactured in its green parts, illustrating the fact that only the green portions absorb carbon dioxide and build up starch.

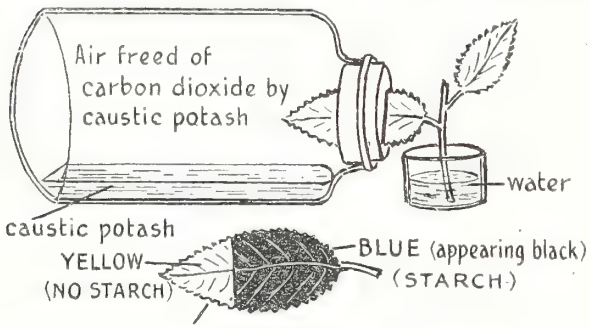


Fig. 8. Moll's Experiment.

A simple experiment proves that carbon dioxide is necessary for starch formation. By placing half a leaf still attached to the tree or on a twig placed in a glass of water through a split cork tightly fitting into a jam jar which contains air freed from carbon dioxide and then exposed to sunlight, only the part of the leaf outside the jar when treated with iodine solution turns blue proving that starch has been produced, whereas that portion in the jar turns yellow because no starch has been formed. This is known as Moll's experiment. (fig. 8).

It will thus be seen that to talk of the circulation of sap is incorrect, for the water, with its mineral salts in solution, drawn from the earth by the roots and transported to the leaves is different from that distributed about the tree which is organic and used as food; and both travel by different routes.

When we compare the baby plant or *embryo* inside the acorn or beech nut with only a small supply of food in the form of starch and proteid; and the enormous mass of organic matter mainly deposited in the form of wood in a large tree, we get some idea of the amount of this material which is obtained from the outside world during the growing season.

Respiration. But in order for the tree to produce all this organic material the tree as a living being must be supplied with oxygen. It takes in oxygen by day and by night from the germination of the seed until the tree dies.*

Professor Percy Groom† describes an instructive experiment to prove that oxygen is essential to maintain the active life of a green plant. Two jars are obtained: into one is poured a little water and into the other, pyrogallic acid dissolved in the same amount of water. Two small sponges on which small seeds have been sown. These are now suspended from corks and tightly fitted into the jars. The seeds germinate on the sponge hanging in air over water, but the seeds in the jar containing pyrogallic acid do not germinate, the pyrogallic acid having absorbed the oxygen and so prevented growth.

The importance of oxygen is also well brought out in the Marsh Cypress (*Taxodium distichum*) when its roots are situated in a water-logged soil from which air is driven out as in its natural home in the United States.

The tree sends up into the air respiratory roots of a porous nature to absorb oxygen from the air and passes it on to the roots in the mud as all living parts of the tree must respire.

It would be an advantage to our street trees to have the surface soil around the roots loosened to let in the air with an occasional pick-me-up in the form

*Respiration is the taking of oxygen into the living cell and giving out from the cell carbon dioxide.

†Groom, Percy. *Elementary Botany.*

of a solution of nitrates, potash and phosphate; and not too heavy a pruning at one time, so that the wounds may become occluded before the plastic materials in the tree have become exhausted.

Lenticels. The stomata are replaced on the greenless twigs and on branches and trunks by corky wart-like passages made prominent by the contrasting colour of that part of the tree on which they are situated. These are known as *lenticels* and are used for breathing purposes, allowing the older stems and roots to obtain the oxygen they require for respiration and also allow moisture to enter or escape.

They occur on all trees, but are not easily seen on trunks having a rough bark. They are more conspicuous on the Elder, Oak, Hazel, Birch and Cherry. On the three last mentioned trees they form conspicuous horizontal lines.

Transpiration. There is a third physiological process of great importance to the tree and that is giving off water in the form of vapour known as *transpiration.*

It is easy to demonstrate transpiration by holding a fresh leaf in an inverted tumbler when the surface soon becomes bedewed with moisture.

The water supply to a tree is of the utmost importance for without it a tree could not be nourished properly.

A tree which has grown up under favourable conditions with a plentiful supply of water with its dissolved minerals and then to have this supply diminished, often causes the topmost branches to become leafless and dry up, and looking not unlike antlers protruding from among the foliage. In such a condition the tree is said to be *stagheaded.*

Large volumes of water must pass from the roots through the leaves into the air as vapour, in order that the tree may obtain the mineral matter it requires.

When one takes into consideration that a crown of some 200,000 leaves of a forest tree may give off something like 100-150 gallons of water on a hot dry day it is an indication of the enormous amount of water evaporated from the leaves of a tree during the growing season; and serves to show the part trees play in the water circulation of the world.

It sometimes happens on a hot summer day that leaves may droop. This is due to the water being given off quicker than it can be taken up by the roots, while wind causes young shoots of trees to transpire so rapidly that they dry up. This is seen, particularly in situations by the sea such as at Ballintoy, giving the tree a clipped appearance on the side of the prevailing wind (see frontispiece).

Leaf Casting. Many trees shed their leaves in the winter. When the ground is strewn with a carpet of dead leaves some people are apt to regard it as due to frost but the leaves would have fallen had there been no frost, preparations being made by the tree some weeks before the leaves fall. This is, partly at any rate, to prevent transpiration that the tree denudes itself of its transpiratory surfaces—the foliage—at a time when the soil is cool and the roots inactive and by this means preserves the water in the tree.

In tropical countries, before the hot dry season commences, many trees denude themselves of their foliage for the same reason, bursting into leaf again in the wet season, but in our climate the leaves fall before the winter cold begins.

Before the leaves are shed, the contents of use to the tree pass into the stem. Even the dead empty framework of the fallen leaves is of use to trees in the forest for they are again used by them in the form of humus. Its removal from the floor of the forest would be detrimental to forest growth.

The covering of humus maintains the productive capacity of the soil while the leaf canopy prevents the loss of soil moisture by the sun's rays and wind. Trees do not exhaust the soil to the same extent as agricultural crops. It is for this reason that poorer soils may be used for forest crops.

In agriculture the soil is conserved and maintained by manures.

Casting of leaves is brought about by the formation of a separation layer, the so-called *absciss layer* which runs right across the base of the leaf. Just below the separation layer a plate of cork is formed which of course is not carried across the base of the bud in the axil of the leaf. This cork layer being impervious prevents any communication with the leaf which consequently dies.

The cells of the separation layer loosen and separate; and the leaf falls at a touch or aided by wind, drops to the ground, leaving a corky scar called the *leaf-scar*. The dots on the scar are the broken ends of the *vascular bundles* joining the stem and leaf. The colour and shape of the scars and the arrangement of the vascular bundles assist in the identification of many deciduous trees in winter.

The reason for the withered leaves of a Beech hedge and those on young Oak and Beech saplings remaining attached is said to be due to the absence of a properly developed separation layer.

Trees which cast their leaves in winter are known as deciduous; those whose leaves persist for two or more years, the new leaves appearing before the old leaves have fallen, are known as evergreens. The needles of many cone-bearing trees (*coniferae*) are long-lived. In the Douglas Fir they usually live for eight years; Spruce to eight to twelve years, and in Silver Fir the needles may persist even up to fifteen years.

Evergreen leaves are usually thick-skinned and tough. They close up their stomata in the autumn and thus preserve their water-supply.

Fig 9. Leaf-bud under leaf-stalk of Plane.

The evergreen conifers are well adapted to restrict transpiration with their stiff leathery needle-like leaves. Larch, Marsh Cypress and the Maiden Hair tree (*Gingko*), with its fan-shaped leaves, of China and Japan are deciduous. The last-named is the most interesting tree living to-day. Indeed owing to its peculiar interest to botanists it has been removed from among the conifers into a new class-name—Gingkoales. Specimens may be seen in the Botanic Gardens Park.

Trees frequently produce two kinds of shoots: long or normal shoots and dwarf shoots, the latter growing little each year, often reaching only an inch or so in length after growing for many years. They may be recognised by the closely set rings of scars left by the fallen bud-scales annually, on the bursting of the bud.

Dwarf shoots are well seen in the Beech, Ash and Birch. They form the spurs on fruit trees.

When a Pine or the deciduous Marsh Cypress cast their leaves they really shed dwarf shoots (*cladoptosis*). Even deciduous trees sometimes cast off dwarf shoots. Occasionally the ground underneath an Oak tree will be seen strewn with short twigs in the autumn. These have not been torn off by wind, nor have they been nipped off by birds or squirrels, but is the normal casting by the tree, as the ends of the twigs would show, as well as by the clean and protective scar left on the trunk after the fall of the leafy shoot. Black Poplar is another tree which sheds foliage twigs, often of considerable length.

Buds. The following season's growth is contained in a bud which consists of a short axis and rudimentary leaves closely packed together and is therefore an undeveloped shoot. As it is to remain in a quiescent condition through the winter it is usually protected by tough scales. Sometimes the scales are covered with hairs or gummy substance as an additional protection from cold for the delicate parts inside; and this further prevents loss of moisture. The young leaves inside the scales may be further protected by a covering of woolly hairs, so well seen in the Horse-chestnut bud.

In two British trees, the Wayfaring Tree (*Viburnum Lantana*) and the Alder Buckthorn (*Rhamnus Frangula*), the buds are without scales and rely entirely upon a felt of hairs for protection. Such buds are said to be naked, while the Willow has a single scale covering which really consists of two scales fused together.

In the Plane before the leaves fall in autumn no buds can be seen because they are covered by the base of the leaf stalk (*sub-petiolar*) (fig. 9, p. 142). When the leaf falls it forms an almost circular leaf-scar around the base of the bud. During the winter the young leaves within the bud are protected by a dense covering of brownish hair. In the Alder it is interesting to note that the axillary buds are provided with short stalks (fig. 10).

Fig. 10.
Stalked buds of Alder.

Sometimes a bud contains both foliage and flowers and is then termed a mixed bud, while buds may contain flowers only as in the Wych Elm and these are distinguished from the foliage (*vegetative*) buds by being round and plump. Normally there is one bud in the axil of the leaf or leaf-scar which gives rise to a lateral branch while the terminal bud continues the growth in length.

The bud-scales when they fall off on the opening of the bud in spring, leave a girdle of closely-set scars and from this it is possible to tell the annual growth of a particular twig (fig. 11). It is well seen in the Sycamore and Horse-chestnut.

In some trees, in addition to the axillary buds and close to it, are additional buds termed *accessory buds* as in Hornbeam, Ash, Walnut, Elder and some Willows.

The arrangement of the buds may be opposite, as in the Horse-chestnut, Sycamore and Maple. Usually each alternate pair of buds is at right angles to the pair immediately above and below. This crosswise or *decussate* arrangement as it is called occurs in the two species mentioned above. Sometimes they are alternate and frequently arranged in two opposite rows (*distichous*). This

arrangement may be seen in the Beech, Lime and Horse-chestnut. The Plane differs from the Sycamore and Maple in having its leaves alternate (fig. 9, p. 142).

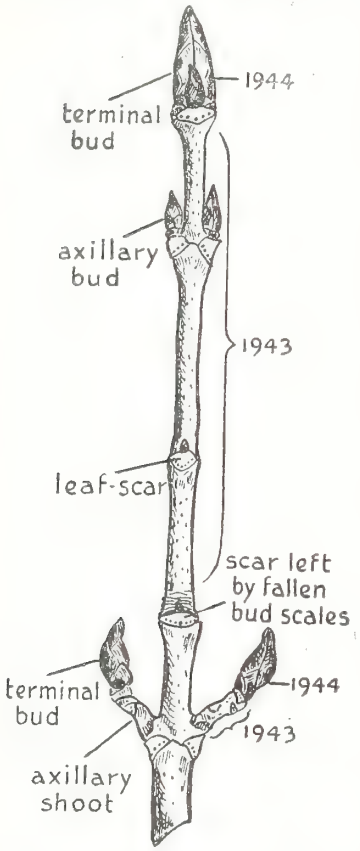


Fig. 11. Showing annual growth in Sycamore twig.

More commonly buds have a spiral arrangement.

The size, shape and colour of the buds, and their arrangement, also form a useful aid to the identification of trees in winter condition.

Many deciduous trees are stimulated to unfold their winter buds in the same period in which they are produced instead of remaining in a state of dormancy until the following spring. This occurs especially if the weather is wet, and may often be seen in the Oak, resulting in a new crop of shoots in midsummer. They are called " lammas shoots " and may be distinguished by the rich pale green hue of the fresh leaves, among the older and darker green foliage.

I have seen these lammas shoots in July (1944) on the Norway Maple, Sycamore and Lime, and on a Beech hedge.

All axillary buds do not necessarily develop normally in the following year to form new shoots, but many remain in a dormant condition for many years without losing their vitality. This occurs especially on trees having a smooth rind, and are termed dormant buds, which by the elongation of their connection with the skin they continue on its surface and only under favourable circumstances do they burst into new shoots. Shoots which develop in this way on the trunk are known as *epicormic* branches and are common on old Elms and Oaks.

[In Fig. 11. The " scar left by the fallen bud scales," refers to the girdle above the scar left by the fallen leaf.]

Sometimes these latent buds become disconnected with the trunk but grow in thickness and produce their own wood to form a globular shoot, the familiar wood-ball (*spheroblast*), within the bast (see page 145). They may be seen on some trunks of the old Beeches in the Botanic Gardens Park and are easily detached by a little pressure with the fingers.

Dormant buds have arisen in proper order in the axils of the leaves, but buds may arise in an abnormal or irregular manner on any part of the trunk and develop into shoots or may even arise upon roots as frequently happens on the roots of Poplar, Birch and Elm, when they shoot up into *suckers*. These *adventitious* buds often give rise to shoots on "pollard " Willows and from the " stool " left in the ground after a tree has been felled.

Bark. The trunk and branches are covered by a dead, more or less corky layer called the bark. It is an impervious coat preventing loss of moisture and

gases. It also guards against external dangers such as frost. Severe winter frost sometimes causes cracks in trunks often followed by longitudinal ridges termed frost-ribs. Bark also acts as a protection against animals and fungi attack.

New bark is usually added from within; and in some trees it is not readily shed when it becomes thick and ruptured by the continuous increase in the thickness of the wood forming longitudinal fissures, so characteristic of many old trees.

Sometimes bark is detached in the form of scales, well seen in the Scots Pine, Plane and Strawberry Tree (*Arbutus*).

In the Beech the bark remains thin and smooth until the tree is very old, when it may show a tendency to become furrowed at the base of the tree.

Professor Percy Groom points out that the nature of the bark gives an indication of the tree's habit. Trees with thin, smooth, often dark-coloured bark are shade-enduring species, whereas those trees with thick, rough bark are light-demanding species. The longevity of the needles of Douglas Fir, Spruce and Silver Fir also indicate their shade-enduring capacity. The forester divides trees into shade-bearing species as Beech, Hornbeam, Silver Fir and Spruce; and light-demanders as Oak, Elm, Scots Pine and Larch.

The brown or red colour of bark is chiefly due to tannins to which it owes its preservative qualities. The white colour of the membranous bark of the Birch is said to be due to the presence of birch-resin (*betulin*).

Each tree has its own characteristic bark and forms a feature which is useful in the identification of trees. For example in old trees of Silver Fir longitudinal and horizontal cracks appear in the bark which produces thin scales that assume a somewhat angular form, whereas in the Spruce the scales are roundish and the bark is without prominent fissures. Neither species have thick bark which suggests shade-enduring habit.

Bast. Just inside the bark is a living tissue called the *bast*, and through it is passed the food prepared in the leaves for the use of all the growing organs of the tree. Some of it may be stored in the wood as a reserve for future use.

In popular language the term bark is applied to the bast and all tissue outside of it.

Reproduction. So far we have been dealing with what is termed the *vegetative organs*—the root, trunk, branches and foliage-leaves, their relationship to one another, and the work they perform to maintain the life of the tree. But the tree has still another important function and that is to provide for a continuance of the species by means of seed. To do this flowers must be produced.

A flower consists of the terminal part of a shoot (*receptacle*) bearing modified foliage leaves. That a flower is an altered foliage shoot is partly furnished by *prolification*. Sometimes a pear fruit is prolonged into leafy shoot, resuming vegetative growth. The cones of Larch and Cryptomeria frequently terminate in a leafy shoot.

If we examine a typical flower we notice on the outside the *sepals*, sometimes quite leaf-like, collectively called the *calyx* which protects the parts inside when in the bud stage. Inside the calyx the *petals*, sometimes gaudily coloured

and together are called the *corolla*. Within the corolla are a number of *stamens*, each consisting of a stalk and a head or anther in which the *pollen* is produced in the form of grains and which is the fertilising substance. The stamens are therefore the male organs. In the centre of the flower are the carpels which in some flowers are joined together when it is called the *pistil*. The carpels contain the ovules and after fertilisation become the seeds.

The calyx and corolla are not directly concerned with the production of the seed and are therefore termed the *non-essential organs* while the stamens and carpels are directly concerned in the production of seed and are called the *essential organs*.

Insect-pollinated flowers are usually conspicuous so that they may be seen from afar by the insect, usually scented and provided with sugar-producing glands called *nectaries* while the pollen is sticky or rough so as to adhere more readily to the insect's body.

Fruit trees, Laburnum, Horse-chestnut, *Catalpa*, Lime and Sycamore are examples of insect-pollinated trees. In the Sycamore, although the flowers are not individually conspicuous, they are made noticeable by being massed together in dangling tassels and the drops of nectar excreted by the flowers induce bees and flies to visit them.

The flowers of most forest trees have no sepals and petals. In the Willow the catkins of flowers have neither but are provided with nectaries. Being massed together in catkins they are made prominent and are visited by bees, unlike its allied genus, the Poplars, which are wind-pollinated.

The Beech, the Oak, the Sweet Chestnut, Hazel and the Pines are examples of wind-pollinated trees and the flowers are small and unscented without nectaries and an abundance of dry powdery pollen is produced. In the Pines the pollen grains are further adapted for distribution by wind as each is furnished with an air-bladder on either side so that they may be readily wafted about.

Some wind-pollinated trees frequently flower before the leaves appear as in Hazel, Poplars and Ash (plate). The Oak and Beech produce flowers in the early stages of the unfolding of the leaves and this gives the pollen a better opportunity of reaching the receptive part (*stigma*) of the carpels.

Species having male and female flowers on two individual trees are said to be *dioecious*, literally in two houses. Examples are met with in the Willow, Poplar, Juniper and Yew. Species which have the male and female flowers on the same tree are called *monoecious*, literally one house. Examples are the Oak, Walnut, Plane, Alder and Pine.

After fertilisation and the seeds are mature it is essential that their distribution should be far and wide and not dropped under the shadow of the parent tree and thus avoid, as far as possible, a keen competition among the seedlings.

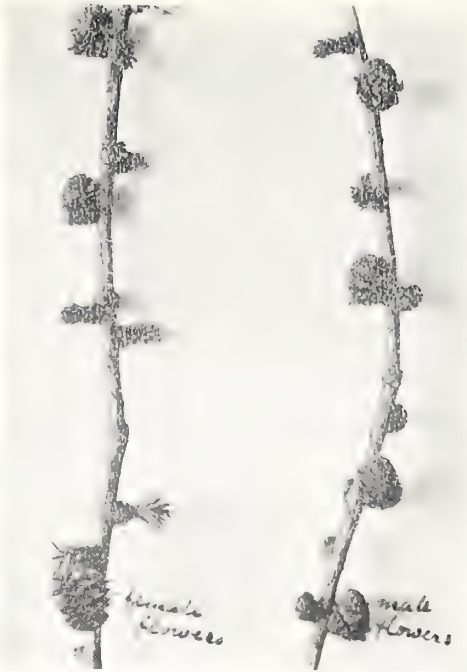
The part of the flower which remains until the seeds are ready for severance from the tree is called a *fruit*. It does not matter whether it is like an Ash "key" or an apple, it is always termed a fruit.

Most forest trees have dry fruits; they may take the form of a nut as in the Hazel, Oak, Beech and Sweet Chestnut and are carried and dropped by animals. The squirrel and large birds like the rook are active agencies in dispersal.

Frequently the fruit is provided with winged appendages for dispersal by wind as in the Ash, Birch, Alder, Elm and Sycamore. In the conifers it is

HAZEL. A flowering branch with drooping catkins of male flowers. The three buds below the catkins terminate in female flowers, the purplish-red thread-like stigmas project from the top of the buds.

CRACK WILLOW. Male flower spikes (above); and female spikes (below and right). (Borne on different individual plants.)



Photos: A. Harold Bastin.

LARCH. The purple-red female flowers and the yellow male flowers are situated at the apex of dwarf shoots on the same tree. This conifer sheds its foliage (needles) every year.

Photos : A. Harold Bastin.

Open Cones: 1, Erect cone of Cedar, scales fall off separately. 2, Larch. 3, Weymouth Pine. 4, Douglas Fir. 5, Spruce. 6, Scots Pine. Closed Cones: 7, Larch. 8, Australian Pine (with very young cones beneath). 9, Spruce. 10, Weymouth Pine. 11, Atlantic Cedar. 12, Douglas Fir. 13, Scots Pine (with very young cone beneath).

the seeds that are winged. In the Willow and Poplar the seeds have tufts of cottony hairs attached to them which act as parachutes when liberated from the fruit, or they may adhere to the fleece of passing animals

The term " broad-leaved " and " needle-leaved " (conifers) are often used to distinguish the two classes of trees. Broad-leaved trees are provided with leaves more or less broad and flat and are usually deciduous. The Holm Oak and Cork Oak are examples of evergreen broad-leaved trees.

A conifer usually has narrow or needle-shaped leaves (*araucaria*, broad and pointed) and bears cones with the exception of Yew, Juniper and Gingko. British-grown conifers are evergreen with the exception of Larch, Swamp Cypress and Gingko.

The broad-leaved trees are the source of " Hardwoods " and the conifers the " Softwoods " of commerce.

POSTSCRIPT. The address was illustrated by slides and beautiful models of tree flowers with explanatory labels prepared by Mr. A. Harold Bastin of Reading from the collection in the Belfast Museum. I am also indebted to Mr. Bastin for many of the illustrations. Twigs from trees growing in the Botanic Gardens Park were kindly supplied by Mr. G. Horscroft.

The drawings accompanying the paper were prepared by Mr. I. A. S. Stendall, M.R.I.A.

Those wishing to take up the study of Trees will find it a fascinating subject with abundant material for observation and discovery; and cannot do better than consult the following works by two eminent British botanists, Professor H. Marshall Ward who died in 1905 and Professor Percy Groom whose death occurred in 1931. Both are a great loss to British Botany.

Groom, Percy. *Trees and their Life Histories.*

Ward, H. Marshall. *Trees*, 5 vols.

The last two volumes by Professor Ward were published after the author's death and were edited by Prof. Groom. It was the intention of the author that the book should consist of six volumes, but he left sufficient manuscript to publish volumes four and five.

Both these publications are out of print but they may be seen in the Belfast Museum Library and the Central Public Library.

1st April, 1944.

S. W. Allworthy, M.A., M.D., President, in the Chair.

ULSTER FOLKLORE.

Jeanne Cooper-Foster.

We Irish have a well-known regard for tradition; indeed it is frequently suggested that we have too much, but be that as it may, Ulster folk are no exception. In this province we have a wealth of folklore that is almost unequalled in any part of the country. Ireland occupies a unique position among the nations of Western Europe, for she alone escaped domination by Rome. Here we have preserved an unbroken tradition stretching back to pre-Roman Europe. It is fascinating to think that we have a living link with the men and women who lived in the days before the Romans set out to conquer the world; a link with those earliest tribes who settled in Europe. For folklore, if I may quote Reidar Christiansen, the eminent Norwegian folklorist, " is a link with the past in a deeper sense even than old documents and archaeological remains, leading one, in fact, not to the empty shell of what once was alive, but to the innermost mind of man."

One of the most interesting branches of folklore is the FAIRY LORE. To me it has always been the most fascinating. Very few people brought up in Ulster can have failed to hear tales of the WEE FOLK and all of us have seen the fairy raths and coves where tradition says they lived. There are many theories about the fairies. One very old belief is that they were angels who refused to take sides in the great war in Heaven and who, because of this, were turned out of Paradise and condemned to exist eternally, between Heaven and Earth—remaining permanently on the fence, as it were! Many tales are told of bands of fairies waylaying priests and asking to be assured that they will be redeemed on the Judgment Day, but when a prayer is recited or the sign of the Cross is made, they scatter hurriedly away; the Bible too is a talisman against fairy wiles. Another school of thought believes that the fairies are Nature spirits, but none of the Ulster country folk, among whom most of my work has been done, belong to that school. There is nothing of the Ariel type of fairy about the Ulster WEE FOLK. Old people who have talked to me about them say that they always heard of them being about four feet in height and well-enough built. They were a mysterious, small people, who lived rather like themselves. They made, they scatter hurriedly away; the Bible too, is a talisman against fairy wiles. and forts and, of course, they were believed to possess supernatural powers. Most people ask me, " Do the Ulster country folk still believe in the fairies ? " Now that's a really difficult question. A Co. Antrim farmer once said to me, " Mind you, I don't think there are any WEE FOLK about nowadays, but there must have been at a time, for how else could all the stories of them have risen? All the old folk couldn't have been making them up." And that, I think, is

as near an answer as anyone could give. My Antrim farmer had, as our American friends say, "got something there." For any story must have an origin and it is highly improbable that so many similar tales about the fairies in widely separated parts of the world should have sprung up without any common concrete foundation. Some authorities believe that the fairies were a race of small people who, in very remote times, inhabited parts of Europe—a race something like the pigmies of Africa. Remains of such a small people have been found in Switzerland and there is, at the present time, a race of dwarfs living in the valley of the Ribas in the Eastern Pyrenees. They were discovered by Professor Marapta. He describes them as being about four feet in height, well-built, with small hands and feet and broad shoulders; they are square-chinned—the men having very little beard—slant-eyed and have high cheek bones. And note this, they are red-haired. I shall be referring to red hair later. Now, while I am not convinced that any one of the theories I have mentioned is wholly correct, I think, from the evidence I have collected, that the stories of Ulster WEE FOLK are, in the main, likely to refer to a race of small people who lived here in very early times. I think it is possible that such a race may have gone on living side by side with later arrivals and that they were eventually absorbed. It is even possible that, in remote areas, they may have existed as a separate race right into the Christian era. Any or all of us may have some of their blood in our veins. Tales which would seem to bear out this theory of a small race are very numerous; I want to mention one or two of them specially to show you what I mean. The first story, which comes from North Antrim, a part of the country where coves, forts and stories of the WEE FOLK abound, is about a midwife, or as the country folk say, a "handywoman," who lived in the Ballymoney district. One night she was awakened by a strange man who asked her to come and attend to his wife. Although she did not know the man, the midwife went with him. He led her through bogs and fields and finally they arrived at what appeared to be a small house built against a hillside. The man led her to the door of a room and left her. When her work was finished and the mother and child comfortably settled, the woman was led in the darkness back to her home. On the way back, just for a fleeting second, she caught a glimpse of the man who walked beside her—a small man, one of the WEE FOLK! Some time later she was at a market in Ballymoney and she saw the little man moving about through the crowd. She walked up to him and asked how his wife and child were. He turned in a rage and asked her with which eye had she seen him. She pointed to her left eye and the man spat in it and she was blind in that eye for ever after. This story is known in various other places, Donegal, the Western Highlands of Scotland and in the Holy Land, where jinns take the place of the WEE FOLK. The North Antrim version of the story is incomplete, for in all the other versions mention is made of an ointment which the midwife was given and told to rub on the eyes of the child, and that, either by accident or design, she rubbed some on her own eyes and saw that what she had supposed to be an ordinary house was a cave, and the woman and her husband, fairies. But the point of the story that I wish to stress is that the child of the WEE FOLK was born like any mortal child and the help of a human midwife was necessary. Before I leave this story, there is another point I should like to mention. You remember that in the story, the little man blinded the woman by spitting in her eye. The spittle, in primitive forms of society, has always been regarded as extremely potent, whether because it was so closely associated with the breath, the Essence of Life, or not is uncertain, but its efficacy was never doubted. You will remember how when Jesus cured the blind man of his blindness, He spat upon the clay before applying it to the eyes.

The WEE FOLK, according to the old stories, were much given to stealing women and children. This is a common practice among races which are dying out. Just recently, I read of this happening in Central America, where a nearly extinct tribe of natives was raiding a neighbouring village when the men were absent, and carrying off women and children. In Antrim, Derry and Armagh I have heard similar stories of women being carried off by the fairies. A Derry version is that a woman who had been abducted, was seen, by her husband, about a year later in the proximity of a fairy cove. She spoke to him and told him what had happened. She said that she could not go with him then, but that on the first night of the full moon, she would be riding past a certain spot with the fairies and she asked her husband to wait there and, when she rode past, he was to hit her horse with a twig of rowan: the spell would then be broken and she would be free to return to normal life. On the night of the full moon the husband took his stand at the place mentioned and as the fairy host rode by, he stretched out his hand with the rowan twig, but his hand shook and the twig fell. The host swept on with the woman in their midst. Later frightful screams were heard and in the morning, a nearby field was found spattered with blood. The fairies knew that the woman had been in touch with her husband and so they had killed her. Then there are thousands of stories, and that is not an exaggeration, of fairy women coming to farmhouses and borrowing meal. The loan is always repaid, and after that the barrel would never be empty. Other stories tell of WEE FOLK who requested farmers to move their turf-stacks, because they were blocking the chimneys of the fairy dwellings. This would seem to indicate a race dwelling underground, yet in close proximity to people who lived in houses of some sort. It also indicates a certain amount of contact of a fairly friendly nature between them. The stories usually end with the farmer complying with the request and moving his turf-stack or, if he does not, his cattle are maimed or some other misfortune befalls him, until such time as he sees reason and does as he was asked. The general trend of these tales would suggest that while the WEE FOLK were believed, undoubtedly, to possess supernatural powers, they had to be provoked before they used them to injure anyone. I said just now that the fairy request to have the stack removed because it got in the way of their chimneys, indicated an underground dwelling near a farm building. In the townland of Gortnee, in North Antrim, I know of two adjoining farms where there are coves in the farmyard. In one case, a byre has been built over a cove and in the other, the entrance has now been blocked up. By the way, it might be of interest to mention that a man fleeing from the Yeomanry in 1798, found refuge in one of these coves and was fed by scraps of food dropped between the stones which concealed the entrance. He lived there for quite a long time, until, in fact, he could be smuggled out to a ship bound for America. In the nearby townland of Ballyclogh there are many of these coves. One is in a farmyard, near which is a large standing stone known locally as " Johnny's Big Stane," but all that is known about the stone is that it would be unlucky to interfere with it and the cove was, so they say, the dwelling of the WEE FOLK. This particular townland is a veritable goldmine of old beliefs and customs, many of them still being practised and not looked upon as being in any way extraordinary.

Fairies were believed to be very gifted musicians and tales are told of mortals who learned beautiful airs from listening to the fairy music. Many of our exquisite old tunes are believed to have come from the WEE FOLK.

And I must mention the subject of changelings. Most people have heard of the belief that fairies sometimes substituted one of their own ill-favoured children

for a mortal child. This, it seems, was done before Baptism took place. Many cruel rites used to be practised on children believed to be changelings, such as placing the child on a shovel and putting it out on the manure heap all night, or of burning the Sign of the Cross on it. If the child was a fairy, it was thought that its own people would rescue it before it came to real harm and if it was not a fairy, I suppose it was just too bad. I came across a suggestion one day, that suspected changelings may have been children who had rickets, a disease whose cause was not known or understood in earlier days. A few years ago, I was told of a Co. Antrim man who was locally believed to have been a changeling, but he must have fared better than most, because he looked very hale and hearty then and he must have been around seventy. He was small, around five feet two and had red hair, then turning grey.

There is another type of fairy one hears about. It is sometimes called a Brownie and sometimes just a fairy-woman. This fairy is always closely associated with the household and is invariably heard of in connection with assisting in household tasks. The Grogach, a large, uncouth Being who helped out of doors, seems to me to be of the same type. They may, originally, have been household gods; I rather think they were, or they may perhaps have been a primitive slave race. I will tell you a story about one of these fairies. It comes from Magilligan in Derry. Two old women named Dunlop lived in a small cottage in a remote district and they earned a living by spinning and weaving. One winter they were very badly off and they had great difficulty in making enough money to keep going. One morning when they got up, they found that all the flax they had left on the "rock" beside the wheel the night before had been spun. This went on for several nights and at last they decided they would watch and see who did the work. At midnight, the door opened and a small, naked woman walked into the kitchen. She went straight to the rock, lifted the flax and began to spin. She continued to work until dawn, then she went out. One night, it was a cold night with snow on the ground, the two women watched her come in and she seemed to feel the cold terribly. They decided to make her a nice warm coat and when it was finished, they put it on the rock beside the wheel. When the little woman came in, she picked up the coat and looked at it, then she burst into tears crying "I must away, I must away, I have got my wages and I must away." It seems that this type of Being always went away for ever if a gift was left for it.

The fairy-thorn is a familiar sight to anyone who travels through the Irish countryside. The lone, old, twisted thorn-tree growing in the middle of a field is looked upon with awe and no farmer I ever knew would cut one. I don't believe even a Government subsidy would induce most farmers to touch it. In most districts it is considered very unlucky to bring hawthorn blossom into the house, not just blossom from a fairy-thorn, but any hawthorn blossom. Although these trees are called "fairy-thorns," I think this idea is really the remains of tree-worship, though it is just possible too, that trees were worshipped by the early dwarfish people (if, for the moment, we may assume their existence) and later arrivals, who worshipped something else, may have seen these little people performing their sacred rites around the trees, and so the belief may have arisen that the fairies gathered around these thorn trees on the nights of the great Celtic Festivals, Hallowe'en, May Eve, Midsummer. There is much evidence that Tree and Well worship existed in Ireland in remote times. The early Church, in its wisdom, took over many of the pagan wells and blessed them and gave them the names of Christian saints, believing, correctly, that in time the pagan connection would be forgotten. These wells were—and indeed, I think I might

use the present tense in most cases—used for cures and luck-bringing. Ancient trees are very often found beside the wells and are frequently to be seen festooned with threads, rags and other offerings left by people who have wished there, or who came hoping to be cured of some ailment. There is one of these sacred wells in the deerpark belonging to Castle Archdale in Co. Fermanagh. This deerpark was originally the site of a Cistercian monastery. I was told that if I stood in the well and wished and then hung some portion of my apparel on the old tree beside it, that my wish would be fulfilled. The well, by the way, is a very shallow one.

There are many traces of the old pagan worship still to be found in Ulster, like the lighting of fires, " bone-fires " is the name for them in the country districts, on St. John's Eve and on May Eve. Both these days were, of course, old Celtic feast days. In some districts, in those far off days before the war, the young people used to resort to the hill-tops and light great fires around which they danced and when the flames died down they took turns in leaping over them. The cattle were driven between the fires for purification and household fires were extinguished and re-lighted with brands from the sacred fires. Many of the old people even now, will not allow fire in any form to be taken from the house on these days. They say it would be " unlucky," but they are, in fact, observing the ancient ritual connected with the fire worship. At the result of a questionnaire issued last year by the Irish Folklore Commission, it was discovered that St. John's Day in Ireland has a special significance for fishermen. I know that it has special importance for the fishermen of the River Bush, that ancient river which was famous even in the days of the Venerable Bede and on whose banks, at the place where the little town of Bushmills now stands, there lived Amergin, the famous poet of the Milesians, a people who was said to have arrived in Ireland somewhere about 1700 B.C. The Bush fishermen of to-day have a communal dinner on St. John's Day when they eat new potatoes and freshly aught salmon. An older generation of these fishermen used to place bunches of a plant known locally as " purple rocket " in the windows of their houses on that day. I think the common name of this plant is Purple Orchis. I was very interested to hear some time ago that these plants have been seen growing in great abundance on the sites of houses burned in the raids and I think, perhaps, there is a connection here; these flowers may have bloomed profusely on the old fire-sites of past days and may thus have been thought sacred plants.

Everybody, of course, knows a good deal about Hallowe'en. This was the Celtic New Year and many odd customs have come down to the present day. The most extraordinary one is that of general licence and horseplay which is still indulged in by young men in many remote country districts. This usually takes the form of removing gates, carts and any farm implements left around and depositing them in some inaccessible place. This sounds like mere hooliganism, but there is more to it than that; it's too widespread. Another Irish Folklore Commission questionnaire revealed that the practice is known in almost every district in the country. I cannot offer any reason or explanation for this custom, except to suggest that it may be connected with a custom known in other parts of Britain as the reign of the Lord of Misrule. Another custom which has practically died out in Ulster and which has a counterpart in Cornwall, is that of playing " caman," a rather primitive kind of hockey, on Christmas Day. The teams were usually rival townlands.

Some little time ago, I heard about an extraordinary survival of fire-worship, in the form of the Fire Curse. The cursing took place about thirty years ago in the townland of Ballyclogh and I heard about it from the man against whom

the curse was invoked. He had bought a farm which the previous owner was leaving unwillingly. When he arrived to install his belongings, he found the hearth piled high with stones. He knew at once that the fire curse had been made and with the help of his brother, he removed the stones and deposited them on the doorstep of the man who was responsible. Although the tradition of this curse was known to both men, neither was aware of the exact form. Originally, it was necessary to use special " cursing stones " and each stone carried a special evil intention, such as death to the enemy or injury to his cattle or any other such thing; the stones were placed in the hearth, the fire, of course, having been extinguished—in itself an evil thing to do, unless on the days when the sacred fires were kindled—and a final malediction said. The stones were then scattered widely apart. The only means of undoing the curse was to retrieve every single stone. In the days when belief in the power of such things had a firm hold on the people, the psychological effect of this curse on a man must have been very terrible, for he could never be quite certain that he had indeed found all the stones used against him. Indeed, in the case I have mentioned, the farmer who was the victim told me that ill-luck had followed the house since. You see, every misfortune that occurred afterwards was attributed to the effect of the curse. When I heard of this case, I thought that it must be unique, but last summer I was told of a similar case which occurred also in the Bushmills district.

There are remains of sun-worship still in the country, like the practice of doing things in " a sunwise direction." Farmers build stacks " sunwise " and people stir their pots the same way. Old people used to dislike anything to come between them and the sun. I heard of a farmer who was going to Comber and quite suddenly an old woman darted across the road nearly under the horse's feet. Luckily no one was injured, and when she was questioned, the woman said that the horse and cart were going between her and the sun.

Then too, we have the persistence of belief in spirits connected with rivers, lakes, mountains and so on. The mouth of the River Bush, which I mentioned before, was believed to be haunted by an apparition known locally as " The Copper Man." He is said to have been seen frequently by the fishermen. One old fisherman told me that he had seen the apparition once when he was approaching the river from Blackrock strand. The Copper Man was standing near the footbridge, close to the old fording place. Sooner than go near the bridge, the fisherman swam the river lower down. He quite definitely believed he had seen the apparition, who is, no doubt, the ancient spirit of the river. And how many of us have seen people—and perhaps have done it too!—throw a coin into the Boyne when crossing the bridge at Drogheda? This is done " for luck," but it is a survival of the custom of paying tribute to the spirit of the River Boyne, another river renowned in ancient days. Most people have heard of the Grey Man who has given his name to the path at Fair Head, Ballycastle, which he is supposed to haunt. Near Articlave in Co. Derry there is a hill which is said to be haunted by an apparition, known locally by the rather beautiful name of " The Maid of the Mist." Children used to be told that if they were naughty, the Maid would get them. So the gods of ancient days become the bogeys of another age! Lough Erne is believed to claim a victim every Whit Monday. And, incidentally, there is a very widespread belief that people who are born on Whit Sunday will die by drowning or will meet some other violent death. There is too, a general belief that persons born on Easter Sunday will be unlucky and animals born on that day will be deformed. So strong is the belief that no one will set eggs due to hatch on that day. As to the origin of the belief I have no idea, but it is true that most country people firmly believe it.

Since I am on the subject of animals, I might perhaps mention some odd beliefs that are prevalent about them. Rats are believed to be very intelligent and to understand human speech. In country areas, if one is going to lay poison for rats or set traps, it must not be spoken of in the vicinity of the rat holes. It is believed too that rats will leave a place if the owner tells them of another to which they can go, but the alternative accommodation suggested must be as good as that which they are asked to leave. (This sounds rather like the law about tenants and landlords, doesn't it?) These beliefs about rats are not confined to Ireland; similar beliefs are known in Morven in Scotand and some little time ago, I read in an American magazine, *Collier's Magazine* to be precise, that there is a similar superstition in Maine. All that is necessary there is to leave a note for the rats informing them of the alternative accommodation; so you see the American rats are much more clever than ours, they can read and ours, so far as I know, are quite illiterate. I think it is likely that the belief travelled to Maine with those Ulster folk, the Scotch-Irish as they were called, who emigrated in such large numbers to New England in the 18th and 19th centuries. Many of these people formed colonies in Maine. There is a very widely held belief that animals are psychic—dogs and pigs especially. I have frequently heard of dogs running in terror from some place where something uncanny was thought to be. In Co. Antrim, pigs enjoy the reputation of being able to "see" wind. I think the explanation of this may be that pigs are sensitive to weather conditions and behave in a peculiar way when a storm is approaching. Cats in most countries have always had much of a reputation for uncanniness and the stories told in Ulster about their weird powers would fill volumes; stories of cats who suddenly spoke with human voices, cats who disappeared after a stranger had come into the house and spoken a strange message, and so on. Cats once were, of course, sacred animals in some countries, Egypt for one, and at some time they may have been sacred here too. One very curious belief that I must mention is that in nearly all remote country districts, cats are carefully kept away from a room where there is a corpse. It is believed that if the cat should jump over the body, it will steal the soul.

There are very many beliefs and customs connected with death; the best known of these is, of course, the Banshee. The Banshee appears to be a direct descendant of the Washer at the Ford, that fearful hag, who in ancient days used to be seen before battles washing the blood-stained garments in a stream and keening for the heroes about to die. The belief in this Being is so firmly established that I believe it will last for many a long day in Ulster, if indeed it ever dies.

Last winter I was lecturing in a small town in Tyrone and I mentioned a banshee. When my talk was over a young woman in the twenties came to me and said, "I heard a banshee about a month ago." She was quite matter-of-fact about it. I was, of course, tremendously interested and asked to be told all about it. She said that her entire family had heard it. Her father heard it first and went to the door to see if there was anything about, but there was nothing to be seen. The wailing continued and he called the rest of the family to listen, seven people in all. The shrieking lasted for fully a quarter of an hour. I asked if the sound was nearby and the girl said it was quite close to the side of the mountain near the house. The noise, she said, was quite unlike anything she had ever heard before, but her father had heard it twice previously. I asked if a death in the family had followed the warning; she said not in her family, but in that of a neighbour. It was a neighbouring family that the banshee followed and one of that family had died the day after the noise had been heard,

It is said that the banshee brings the death warning only to people of the old Milesian race, that is usually families who have an "O" or a "Mac" in their names, but I have heard tales of the banshee in families with very English-sounding names. Of course, one must remember that many Celtic names were Anglicised in Ulster after 1641 and names, at the best of times, are most unreliable indicators of race. A woman, now living in Belfast, but a native of a country district near Ballycastle, told me that she once saw a banshee—the only case I have ever come across. She said that one evening she was crossing a bog, when quite suddenly, a little wizened woman, about three feet in height, leapt up in front of her. She had wiry red-hair sticking up all over her head and she ran in front, screaming and wringing her hands. Eventually she disappeared in a hollow in the bog. When my informant arrived home, she found that an uncle had died. By the way, all banshees are credited with having red-hair, like Maeve Roe of Dunluce, the MacQuillan banshee. This banshee is locally believed to sweep out the room in the tower known as "Maeve Roe's Tower" in Dunluce Castle. Maveen Roe, the O'Neill banshee, is also red-haired and so too is Gramie Roe, the banshee of the O'Cahans of Dungiven. "Roe," of course, means *red*. I might mention here that the fairies are generally believed to have red-hair and everybody knows how unlucky it is to be "first-footed" on New Year's morning by a red-haired person! Fishermen used to consider it very unlucky to meet a red-haired woman on their way to the boats. In many districts even now, red-hair, especially in a woman, is considered to bring bad-luck to a churning. In a North Antrim district, there is living now, a family who are feared and loathed by all their neighbours. These people have, almost without exception, red-hair. They are very small, the men not exceeding five-feet-two and the woman around five feet. They have very broad heads which taper down to narrow, rather pointed chins. They look different from the neighbours. Their name is a Scottish one, but so are the names of most of the people in the district, though theirs is the only family of that name in the district. I have enquired very closely into the common dislike of these people and I found that they were believed to possess the EVIL EYE and that they had blinked animals and churns. It was most firmly believed that they brought ill-luck into any family they inter-married with. Yet these people are really most kindly disposed and always ready to lend a helping hand. No tramp is ever turned from their door empty-handed. It's a curious case and the only one of its kind I have found. It may be that the original cause for this fear has long since been forgotten and that the EVIL EYE is just a means of explaining it away. But the fact that this family differs so much from the neighbours and their lack of stature and the red hair, suggests to me that it may well be a race memory of a small, red-haired folk who were conquered by another people who, although numerically and physically superior, retained a curious fear of the conquered race.

In all our country districts there are preserved many curious customs and beliefs. I don't want to use the word "superstitution" because it is so misleading. One is inclined to call anything one doesn't understand or believe "superstition." It's only superstition if it is the other fellow who believes it. And anyhow, the beliefs of yesterday become the superstitions of to-day and, who knows, at some future time, some of our most cherished beliefs may be called that too. As one would expect, many beliefs and customs connected with birth, marriage and death have been preserved. Most people have heard that children born with a caul or cap on their heads are believed to be immune from drowning. I had frequently heard about seamen of a past generation travelling long distances to obtain a caul, for the power was transferable, but I thought

that the belief was extinct; then just about two years ago I saw an advertisement in the *Irish Times* which offered £5 for a caul. It is considered unlucky for anyone to come to see a new-born child without bringing a gift. This is supposed to follow the tradition of the Wise Men bringing gifts to the Infant Christ, but I suspect that the custom was old even when they did it. In Co. Down I heard the expression that the gift was to "hansel the child." It just means to bring good luck. It used to be the custom for neighbours and friends to gather into a house where a child had been born and to spend the night in eating and drinking and general merrymaking—Blessed Feasting it was called. The habit has, I think, died out in most places and no bad thing either, for in poorer houses the feasting used up food and money so that the unfortunate mother had to go without necessities.

Marriage too has its customs and I remember when every wedding couple had a shot fired after the carriage as they drove off to the church, for in rural Ulster the belief that the bridegroom must not see the bride until she arrives at the church does not exist—they usually go off together in the same car or even on foot, but the parting shot was always fired as they left the bride's home. I don't know why it was done; the people who did it said it was "for luck," but it may possibly have been to scare off evil spirits. Bonfires were lighted to welcome them back from the ceremony and in the evening, when the wedding-party was in full swing, the young men of the district used to gather around and create a terrific din by banging on drums, tins, or indeed anything that would make a noise.

And Death, that great final mystery, has of course many customs connected with it. No Ulster man or woman needs to be told of the "Wake." It is still held in the country, but it is gradually dying out. Wakes were not always the sober, respectable gatherings we know now. Many old people remember wakes that degenerated into drunken revels. Wake games used to be played. Some of the games that the country children play are, I think, survivals of the old-time wake games, like a game I used to play when I was a child. Some of you may know it. The rhyme goes "Green gravel, green gravel, your grass is so green, the fairest young maiden that ever was seen. We'll wash her in milk and dress her in silk and we'll write down her name with a gold pen and ink." That, I think, was very likely, originally, a wake-game. In many country houses, clocks are stopped at the time a death takes place and frequently mirrors are veiled. And as I said before, cats are kept away. In North Antrim and Derry it is still believed that a gap in a funeral procession is a certain sign that another funeral will pass that way soon. It used to be a common practice to put pennies on the eyelids of a dead person and to put a hammer in the coffin. This was done too, in the West Highlands of Scotland. I once saw a farm labourer spit on a penny, rub it on his hands and then throw the penny after a funeral procession. When I asked why, he told me that he had warts which he wanted rid of and so he sent them with the dead!

In the days before medical facilities were within the reach of all, people developed a highly complicated system of cures and charms. I shall only have time to mention one or two of these very briefly; the subject is a vast one and could easily occupy an entire lecture. First let me say that many of these charm cures were and are herbal remedies and possibly very good too. There is still a great belief in these charms and they are resorted too very frequently. I saw an advertisement in a Belfast paper recently for someone who could charm a sprain. Many people claim to have this charm. It is a subject worth investigating, I think. Some of the cures may be faith cures, but it is difficult

to know for certain as the people who practise them believe that they are only effective so long as they are kept in the family and so long as payment is not accepted for services. I know a woman who has a charm for rheumatism, one who can cure ringworm in cattle or human beings, and I am told there is a man living in South Derry who can cure external cancer. There are many extremely odd beliefs about cures, like rubbing warts or styes with a fasting spittle for three mornings in succession. Another wart cure was to rub a coin on the warts and to drop it where someone was certain to pick it up. It was thought the person who found the coin would then have the warts transferred to him. A sprain cure that was often practised was to tie a black thread around the injured part. A sore throat could be cured, it was thought, by wearing your stocking inside out around your neck. And, strangest of all perhaps, is the cure for whooping cough where the child is passed three times under a donkey and if this fails it should be taken to a house where the woman had married a man with the same name as her own and if this woman gives the child a piece of bread the whooping cough will be cured. The bread has to be given spontaneously. The remedy is so well-known that it would be quite unnecessary to ask for the bread. The woman of the house would know what was expected of her when a coughing child was brought along.

It is odd how fragments of old rhymes persist—especially of apparently pointless rhymes. When we were children we used to be told a rhyme which ran, " Put your finger in the crow's nest, the crow's not at home; he's away to Ballymoney to pick a white stone; he's coming, he's coming; he's Nip, Nip, Nip," and here one was playfully pinched. It's quite pointless one would think, yet Jessie Saxby in her book on the folklore of the Shetlands, where she says the folk beliefs are Scandinavian in origin, quotes exactly the same rhyme, except that the crow went somewhere other than Ballymoney. There must surely have been a point to it originally. Was The Crow a Norse marauder whose hold it was safe to attack when he was absent, but woe betide anyone who was caught. And what was the connection between Ballymoney, Co. Antrim, and the Shetlands; did Scottish planters bring the rhyme to Ulster or did it belong to a still earlier day before the planatations; did the Norsemen bring it to Ulster? It's a fascinating thought. Here is another rather odd coincidence, if that's the word, that I came across—the belief that a cradle must not be rocked unless a child is in it. I remember when I was a very small girl, I was visiting a house in a remote bog in North Antrim. I was very much intrigued by a cradle which was suspended by ropes from the rafters, like a hammock. I pushed the cradle to see how it worked and I was told that I must never do that or the baby would get a " sore " head when it was put back. Some years ago I was reading about the folk beliefs of some people who live in the hills of Northern Arabia, and I came across the same belief, with the explanation that the natives there believe that spirits like motion and that when a child was taken from a cradle, a spirit would jump in, hoping to be rocked, and when the child was put back, it was so enraged that it pinched him. It's a far cry from Arabia to an Antrim bog, yet the belief is obviously the same.

One other custom that is rapidly dying out in Ulster is the ceremonial cutting of the last sheaf of corn left standing at the end of the harvest. A generation ago this was done on every farm. The reapers took turns in throwing a sickle at the sheaf until someone succeeded in severing it. It was then carried in triumph to the farm kitchen, where it hung until the next year's sheaf came to take its place. The sheaf is known in some districts as " the hare," " the granny," or " the hag." The two latter names would perhaps refer to some

ancient grain goddess; the name " the hare " may have arisen from the fact that animals took refuge in the last sheaf as they fled before the reaper. Animal names for the sheaf are known in other countries; it is " the fox " in parts of France, for example. The custom is known in Scotland and the North and S.W. of England. It is interesting to note that the custom in Ireland is almost confined to Ulster.

I wish time permitted me to say something about Witchcraft, for it has its place in our folklore; belief in the Evil Eye is still strong in many parts of the country and stories of blinkings, raising of the Devil and many other manifestations of the Black Art are numerous, but I am afraid I must leave it at that and say, in conclusion, that I think, after the war, the Ulster Government should do something about collecting what remains of our folklore. The Eire Government has done magnificent work in establishing and supporting the Irish Folklore Commission, and I feel that Ulster should do something similar. The task of collecting is too vast to be undertaken by individuals and a central body to direct the work is essential. A wealth of material has already been lost and I consider that in ten to fifteen years it will be impossible to collect anything worth while. There have been more changes in the ways of life and thought in the Ulster countryside in the past twenty years than in the previous hundred. Young people at school are not encouraged to take any interest in folklore—at least not in their native folklore. They sometimes hear of the tales of the brothers Grimm and those of Hans Andersen, but rarely anything of their own. I think it is high time such a state of affairs was altered; and if in this lecture, which is only a very brief outline of the subject, I have succeeded in interesting you even a little in the traditional lore of the country, I shall feel that I have accomplished very much that is worth while.

Unfortunately very little has been written on the subject of Ulster folklore, but I should like to recommend the following books to anyone who is interested. First, Elizabeth Andrew's excellent book, " Ulster Folklore," then, E. Estyn Evans' " Irish Heritage " which has two chapters devoted to " Customs and Beliefs." This book should be read by all who are interested in the Irish countryside. And finally, " Country Cracks " by T. G. F. Paterson, a charming little book about the folklore of Co. Armagh.

ANNUAL MEETING.

The Annual Meeting of Shareholders and Members for the year 1943-1944 was held in the Old Museum Buildings, College Square North, on Thursday, 9th November, 1944, at 3.30 p.m.

Among those present were Dr. S. W. Allworthy, M.A., M.R.I.A., President (in the Chair), Messrs. Francis J. Cole, M.R.S.A.I., Hugh C. Love, M.B.E., Professor W. B. Morton, M.A., D.Sc., Mr. A. G. Pomeroy, M.A., Professor T. Alan Sinclair, M.A., Mr. W. E. Sinton, F.R.G.S., Professor Gregg Wilson, M.A., D.Sc., Mr. W. H. Workman, M.B.O.U., and Arthur Deane (Hon. Secretary).

The Hon. Secretary read apologies for absence from the meeting from Mrs. Jeanne Cooper-Foster, Colonel Berry, Mr. A. Albert Campbell, Professor Flynn, Dr. J. Hawthorne, Dr. R. H. Hunter, Mr. R. S. Lepper, Rev. J. R. McDonald, Mr. Robert A. Mitchell, Mr. James R. Young, and Mr. W. B. Burrowes (Hon. Treasurer).

The Hon. Secretary read the notice convening the meeting and intimated that the meeting had been advertised in the local press.

The Chairman called upon the Hon. Secretary to read the Council's report for the year ending 31st October, 1944, as follows:—

ANNUAL REPORT. In presenting the Annual Report of the Society for its 123rd Session, your Council has pleasure in stating that seven varied and instructive lectures were delivered, attracting large and appreciative audiences; and usually followed by interesting discussion.

Your Council desire to express their warmest thanks to the local lecturers for their stimulating lectures.

The Council wish it to be widely known that the printing of a list of lectures does not preclude the reading of original papers, occupying the whole of an evening or part of an evening, either by members or non-members.

Learned Societies like ours have two important functions to perform, one of spreading knowledge and the other of advancing it. Under the latter heading the Society needs more activity if its traditions are to be maintained.

Shareholders and Members. The number of Shareholders and Members at the end of the session was 149 as compared with 150 in the previous year. Five Ordinary members have been elected during the year.

Your Council decided to transfer Debenture Certificate No. 300 standing in the name of the late Professor Thomas Sinclair, M.D., F.R.C.S. (Eng.), to Professor Thomas Alan Sinclair, M.A., Queen's University, Belfast. Dr. Thomas Sinclair became a Shareholder in 1887.

The Society will soon commence its 124th session and although in a flourishing condition the Council would like to see the membership considerably increased for the 125th session.

Hon. Member. Your Council during the session admitted to Hon. Membership Mr. R. Lloyd Praeger, B.E., D.Sc., Sc.D., M.R.I.A., for his contributions to the study of Irish Botany. Dr. Praeger is a Past President of the Royal Irish Academy and was Librarian of the Academy from 1905 until 1931. He is the only member now remaining of the first Council of this Society formed in 1892 on the adoption of the Educational Endowment Act, 1885. Soon after the

formation of the first Council, Dr. Praeger was appointed Assistant Librarian of the National Library, Dublin, which compelled him to retire from our Council much to the regret of its members.

While in Belfast he did useful work as joint Hon. Secretary with Robert Patterson on an Ulster Fauna Committee formed under the auspices of the Society to supplement the good work prosecuted by William Thompson, a former President and author of the " Natural History of Ireland " in four volumes. Little appears to have been done in continuing this work after Dr. Praeger's departure to Dublin. Dr. Praeger retired from the National Librarianship in 1923.

Exchange. The Society continues to receive in exchange for its Proceedings many publications, both home and foreign, of great value. The number received however shows a considerable diminution as compared with that of pre-war days.

From the demand made from time to time for our Proceedings by outside bodies, it is evident they are well appreciated.

Many members too cannot attend our meetings and the Proceedings form the only contact they have with the Society.

A list of the Exchanges will be attached to this report.

Larmor Bequest. It was suggested by the Local Government Board Auditor that part of the credit balance last year might be invested, and your Council decided to invest in 3½% War Stock the Sir Joseph Larmor Bequest referred to in last year's report, with a view to the interest being applied to the Larmor Memorial lectures to be delivered by well known scientists.

Insurance. Your Council has had under consideration the insurance on the building and has decided to increase the insurance on the premises and the contents belonging to the Society to £18,000.

Finance. The Statement of Accounts will be placed before you. They will appear in the Proceedings in the form prescribed by the Local Government Board. There will be some expenses due to painting and repairs to the building. Every care and foresight however are exercised with regard to the finances of the Society.

The Building. Your Agents, Messrs. Davison & Dickey, report that there has been no change in the long term lettings which have remained unaltered and no vacancies have occurred. The present tenants are the Royal Society of Ulster Architects, Ulster Academy of Arts, Workers' Educational Association and The Ulster Hosptial Libraries Association.

The occasional nightly lettings, that is excluding the lettings to the Belfast Naturalists' Field Club £14 10s. 0d. and the Christadelphian Ecclesia £95, amount to £70 5s. 6d., as compared with £32 14s. 6d. for the previous year.

The Agents hope that the partial lifting of the black-out will lead to an increase of income from this source.

During the year the exterior of the building was painted, the area in front was levelled and a new ceiling was put up to replace the old plaster one.

Council Members. In order to comply with the conditions of the Society's constitution, five members of the Council retire by rotation, after serving for three years, namely Colonel Berry, Messrs. W. B. Burrowes, A. G. Pomeroy, Prof. Gregg Wilson, and Mr. W. H. Workman.

The meeting will be called upon to elect five members, to make up a Council of fifteen members.

Colonel Berry has been unable to attend the Council Meetings as regularly as he wished owing to being occupied constantly in war work at Newcastle. At present he is not well enough to attend meetings. Under these circumstances the Council recommend that his name be put forward for re-election.

The four remaining members, being eligible, offer themselves for re-election.

Financial Statement. Mr. Burrowes, your Hon. Treasurer, regrets his absence this afternoon as he had to leave for Dublin. He states that the financial year ended with a credit balance of £96 0s. 11d., subscriptions amounted to £47 11s. 0d. but some were still being received. Rents showed an increase. This year it amounted to £241 18s. 5d. compared with £196 13s. 6d. in the previous year. Dividends amounted to £13 4s. 0d. plus £13 10s. 0d. refunded from income tax. This amount includes the first interest on the Sir Joseph Larmor bequest.

Expenditure during the year included the following:—

	1944.	1943.
Rent and Taxes	£83 1 9	£62 9 3
Printing, etc.	47 3 9	37 19 8
Advertising	20 8 5	15 1 3
Lectures	38 17 0	43 12 8

From the foregoing your Hon. Treasurer considered the financial condition of the Society was very satisfactory.

Adoption of Reports. The President, Dr. S. W. Allworthy, in moving the adoption of the reports referred to the unveiling at Queen's University during the year of a portrait of Sir Joseph Larmor* by Mrs. Stanley Wright; and also one of Sir Samuel Dill which was unveiled by Dr. R. M. Jones, the oration being delivered by Professor T. A. Sinclair. Dr. Allworthy then read the following interesting letter by Sir Joseph Larmor which was published in *The Times*:—

Science and Religion.

To the Editor of *The Times*.

Sir,—In relation to the recent discussion in *The Times* on "Science and Religion," the following conclusion (page 440) to Book III of "Roman Society from Nero to Marcus Aurelius" by the late Professor Samuel Dill, written as long ago as 1905, is interesting almost to the point of prediction:—

"The dream of an earthly paradise, enriched with every sensuous gratification by a science working in bondage to mere utility may have serious results for the spiritual future of humanity. It may need a bitter experience to dispel the gross illusion: yet men may once more come to believe with Plutarch that, as it were, at the back of every soul there is an opening to the divine world from which yet may come, as of old, the touch of an unseen hand."

Faithfully yours,

Joseph Larmor.

Holywood, Co. Down. Aug. 11, 1925.

The Chairman, continuing, said the reports which we have just heard are highly satisfactory considering the war time we have been passing through. The outlook, he was pleased to say, was much brighter now than when we met

*An address on Sir Joseph Larmor, by Emeritus Professor W. B. Morton, appears in the Proceedings, 1942-43, Second Series, Vol. II, Part III, p. 82.

a year ago. The dawn of peace was surely rising, but the vast disarrangement of our social order, combined with colossal national commitments, must cause some anxious and uncertain forebodings. For a time, at all events, we may expect a partial, if not a total eclipse of culture. Everywhere we find demands to make life easy, safe and foolproof and demands to be personally conducted through life, with all risks to be taken by someone else. Nature takes away any faculty that is not used, so in the long run she will make us pay for it. Lord Avebury's ants became helpless who starved almost to death in sight of food because they were used to having it put into their mouths by their slaves. Thus Darwin says in his life that his mind seemed to have become a kind of machine for grinding general laws out of a large collection of facts, so that he lost his taste for poetry, pictures, music, etc., all of which he had been exceedingly fond of in his early years.

However whatever form the new order may take I feel confident that our Society which has accomplished so much good work in the past will continue to provide intellectual interests for those who desire to take advantage of them.

He had pleasure in moving the adoption of the reports, which was seconded by Professor T. A. Sinclair and agreed to unanimously.

Election to Council. The Chairman said we had now to elect five members to the Council and called for nominations.

Proposed by Mr. H. C. Love, M.B.E., seconded by Mr. W. Erskine Sinton, F.R.G.S.—That the five retiring members, namely Colonel Berry, Messrs. W. B. Burrowes, A. G. Pomeroy, Prof. Gregg Wilson and Mr. W. H. Workman, be re-elected for a further period of three years.

As there were no further names nominated, the Chairman declared the names now read duly re-elected.

Any other Business. The Chairman asked if any member would like to bring forward anything of interest before the meeting.

In response Mr. Hugh C. Love said we are (*inter alia*) a Philosophical Society and it seemed to him, during the few years he had been a member, that this side of the Society's work did not receive due emphasis. Continuing, Mr. Love referred to the increasing interest in Philosophy taken by the " man in the street " owing to such writers as Dr. Joad, and Mr. Love expressed the view that there were probably many persons of ordinary education who would be glad to take advantage of lectures by experts given under the auspices of the Society at which their difficulties in understanding philosophical questions could be raised and discussed.

The Chairman thanked Mr. Love for his suggestion and said the matter would be considered by the Council.

Thanks to President.

Professor Gregg Wilson proposed, which was seconded by Professor W. B. Morton and supported by Mr. Francis J. Cole:—

" That the Shareholders and Members present at this 123rd Annual Meeting desire to place on record their high appreciation of the services rendered by Dr. S. W. Allworthy, M.A., M.R.I.A., during his Presidency of the Society from 1940-1944."

Prof. Morton, supplementing the resolution, said he wished to express the great debt which the Society owed to Dr. Allworthy who had discharged the duties of President so admirably in a very difficult time. He belonged to a class

of scientists who are the most valuable of all in a Society like ours, those who may be described as amateur, in the best sense of that word: the sense we have in mind when we talk of amateur cricketers. They are much more to be admired than those who, like myself, gain a living by their science. I confess, Prof. Morton said, that since his retirement from teaching work he found certain branches of his subject fading out in interest. All honour to those, like Dr. Allworthy, whose knowledge was acquired through pure love of it.

Continuing, Prof. Morton said a notable event of the past year was the addition to our list of honorary members of Dr. R. Lloyd Praeger. He is a man who by his researches and by his writings had rendered outstanding service to natural history in Ireland. Prof. Morton said he could not help linking him with his sister, Miss Rosamond Praeger, whose work in sculpture we all know and admire and also her inimitable children's books which hold a delight all their own. She in Art and he in Science have done splendid work for popular culture. When Dr. Praeger's book, "The way that I went," appeared I read it with immense enjoyment, though I was careful to skip all the Botany and all the Geology. I said this in conversation with the author on one occasion; he seemed less impressed with my compliment to his book than with the confession of my own limitations!" His work was done mainly in Dublin, at the Library and the Academy, but we claim him as one of ourselves by making him an honorary member.

The President thanked those members who had spoken and those present for the enthusiastic way the resolution had been received.

The new Council met at the close of the Annual Meeting when Mr. Francis J. Cole was unanimously elected President.

ARCHAEOLOGICAL SECTION.

ANNUAL MEETING.

The Annual Meeting of the Archaeological Section was held in the Old Museum Buildings on Monday, 4th December, 1944, at 3.30 p.m.

The members present were Dr. E. Estyn Evans (in the Chair), Colonel R. G. Berry, Professor T. A. Sinclair, Messrs. J. Theodore Greaves and F. J. Cole (Hon. Secretary of the Section).

Apologies for non-attendance were received from Messrs. R. S. Lepper and A. Albert Campbell.

Arising out of the Minutes of previous meeting, Colonel Berry gave some interesting information in regard to "the pilgrims' camp" on the plateau above the Bloody Bridge, near Newcastle, Co. Down.

The following report was read by the Hon. Secretary and unanimously adopted on the motion of Colonel Berry, seconded by Professor Sinclair:—

Your Committee report that conditions due to the continuance of war during the year 1944 again precluded active investigation of the Antiquities of our province, although in spite of numerous engagements our Chairman (Dr. E. Estyn Evans) found time to visit and report on two important Co. Antrim prehistoric monuments. The first of these was a megalithic site at the head of Glenmakeeran (O.S. 6 ins., sheet 9, 3″ N., 11.25″ W.), some 5½ miles S.E. of Ballycastle. This was reported to him in April, 1944, by one of our members, Mr. A. H. Davison, to whom credit is due for the re-discovery of a monument which was first recorded by the Ordnance Survey officers in 1832. It proves to be a well-preserved double-horned cairn, the first of its kind from Co. Antrim.

Dr. Evans also visited the well-known hill-top passage-grave of Carnanmore, in the same district. The engraved roofing-slab was re-examined and found to have a true spiral and also three C-shaped engravings similar to those recently discovered by Professor R. A. S. Macalister at Knowth, Co. Meath. Both these symbols are believed to be the first of their kind observed in Co. Antrim.

Finally Dr. Evans feels it his duty to report that further serious damage has recently occurred to the picturesque promontory castle of Kinbane, which is in the charge of the Antrim County Council. A large section of the landward wall has slipped into the sea. Unless action is promptly taken another of our historic monuments will have decayed beyond repair, to the grave discredit of archaeology and of the Province as a whole.

Dr. Evans, in the capacity of Chairman of the Archaeological Section of the Society, has drawn the attention of the Ancient Monuments Advisory Council to the condition of this long neglected monument.

It was with much regret that our Chairman was unable to find time during the year to visit the ancient church called St. Mary's at Ballyneery near the Bloody Bridge adjoining the road from Newcastle, Co. Down, to Annalong: a place which he promised to see on the occasion of the last annual meeting.

The following Committee was appointed on the motion of Colonel Berry, seconded by Professor Sinclair:—Dr. E. Estyn Evans (Chairman), Professor T. A. Sinclair, Messrs. R. S. Lepper, A. Albert Campbell, Colonel R. G. Berry, Messrs. S. A. Thompson and J. T. Greaves, together with the following ex-officio members:—F. J. Cole (President), Messrs. W. B. Burrowes (Hon. Treasurer), A. Deane (Hon. Secretary) and Oliver Davies.

There being no further business the meeting concluded.

Committee Meeting. At a committee meeting subsequently held it was decided on the motion of the Hon. Secretary to allow Dr. Evans to draw up to £5 in respect of expenses.

Dr. Evans drew attention to the Meetings of the Council of British Archaeology at which we had not been represented for some time and it was unanimously decided that the necessary steps should be taken through the Ancient Monuments Advisory Council to have the Archaeological Section of the Belfast Natural History and Philosophical Society represented by at least two delegates at future gatherings.

THE ACCOUNT OF BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY

For the Year ended 31st October, 1944.

RECEIPTS.

To Balance as per last Account	£283	15 1
,, Subscriptions	47	11 0
,, Dividends	13	4 0
,, Rents	241	18 5
,, Rebate of Income Tax	13	10 0
,, Miscellaneous Receipts, viz.:—		
Archaeology	8	10 0
	£608	8 6

4% York St. Debenture Stock	£400 0 0
3½% War Stock	239 19 0

We certify that the above is a true Account.

S. W. ALLWORTHY, Governor.
W. B. BURROWES, Accounting Officer.

20th day of November, 1944.

PAYMENTS.

By Rent, Rates and Taxes		£14	3 7
,, Insurance		13	10 0
,, Salaries and Wages		56	5 4
,, Fuel and Light		55	8 2
,, Other Payments, viz.:—			
Printing and Stationery ...	£47 3 9		
Advertising	20 8 5		
Postages	1 5 0		
Lectures	38 17 6		
Audit Fee	1 1 0		
Bank Fee	1 1 0		
Irish Naturalists' Journal ...	6 0 0		
Sundries	6 3 4		
		121	19 6
,, Amount invested:—			
£239 19s. 0d. War Stock 3½%		251	1 0
,, Balance in favour of Account on 31st October, 1944		96	0 11
		£608	8 6

Balance, per Bank Book £109 11 11		
Balance in Accounting Officer's hands	£109	11 11
Deduct unpaid Cheques ...	13	11 0
Net Balance ...	£96	0 11

I certify that the foregoing Account is correct.

W. R. MACONKEY, Comptroller and Auditor-General.

15th day of January, 1945.

EXCHANGES.

*Publications received during year.

ABO—Publications of the Abo Academy.
ADDIS ABABA—Bollettins di Idrobioloqia, Caccia e Persca della Africa Orientale Italiana.
*ALBANY—Bulletins of the New York State Museum.
*ANN ARBOR—Publications of the University of Michigan.
ATHENS—Publications of the Zoological Institute and Museum.
AUCKLAND—Reports of the Auckland Institute and Museum.
BASEL—Verhandlungen der Naturforchenden Gesellschaft in Basel.
BERGEN—Publications of the Bergen Museum.
BERKELEY, CAL.—Publications of the University of California.
BERLIN—Publications of the Zoological Museum of Berlin University.
BIRMINGHAM—Publications of the Birmingham Natural History and Philosophical Society.
BLOEMFONTEIN—Publications of the National Museum of South Africa.
BOSTON—Publications of the Boston Society of Natural History.
*BOULDER—Publications of the University of Colorado.
BRIGHTON—Report of the Brighton and Hove Natural History and Philosophical Society.
*BRISBANE—Memoirs of the Queensland Museum.
BRUSSELS—Annals Societe Royale Zoologique de Belgique.
,, Bulletin Societe Royale de Botanique de Belgique.
BUENOS AIRES—Anales del Museo Argentino de Ciencias Naturales.
BUFFALO—Bulletins of the Buffalo Society of Natural Sciences.
CALCUTTA—Publications of the Geological Survey of India.
CAMBRIDGE, MASS.—Publications of the Museum of Comparative Zoology.
*CARDIFF—Transactions of the Cardiff Naturalists' Society.
CHICAGO—Publications of the Chicago Academy of Sciences.
*CINCINNATI—Publications of the Lloyd Library and Museum.
COIMBRA—Publications of the Zoological Museum of the University of Coimbra.
*COLORADO SPRINGS—Publications of the Colorado College.
*COLUMBIA—Proceedings of the Missouri Academy of Science.
COLUMBUS—Ohio Journal of Science.
,, Bulletin of the Ohio Biological Survey.
COVENTRY—Proceedings of the Coventry Natural History and Scientific Society.
DANZIG—Schriften Naturforschenden Gesellschaft.
*DUBLIN—Proceedings of the Royal Dublin Society.
* ,, "Irish Historical Studies."
,, Geographical Society of Ireland.
EASTBOURNE—Transactions and Journal of the Eastbourne Natural History and Archaeological Society.
EDINBURGH—Proceedings of the Royal Physical Society.
* ,, Proceedings of the Royal Society of Edinburgh.
* ,, Transactions and Proceedings of the Botanical Society of Edinburgh.
* ,, Proceedings of the Society of Antiquaries of Scotland.
EXETER—Proceedings of the Devon Archaeological Exploration Society.
GLASGOW—Transactions of the Geological Society of Glasgow.
GORLITZ—Publications of the Natural History Society of Gorlitz.

GOTEBORGS—Handlungar Regia Societas Scientiarum et Literarum Gotoburgensis.
HALIFAX, N.S.—Proceedings of the Nova Scotian Institute of Science.
HOVE—Annual Report of the Brighton and Hove Natural History and Philosophical Society.
*INDIANAPOLIS—Proceedings of the Indiana Academy of Science.
ITHACA—Bulletins of the Cornell University Agricultural Experiment Station.
LA PLATA—"Manuferos Fossiles de la Republica Argentina."
LAUSANNE—Memoirs and Bulletins de la Societe Vaudoise des Sciences Naturalles.
*LAWRENCE—Bulletins of the University of Kansas.
*LIMA—Memorias Sociedad de Ingenieros del Peru.
LJUBLJANA, YUGOSLAVIA—Transactions of the Natural Science Society.
LONDON—Publications of the British Museum (N.H.).
* ,, Quarterly Journal of the Royal Microscopical Society.
* ,, Publications of the British Association.
* ,, Proceedings of the Royal Institute of Great Britain.
* ,, Quarterly Journal and Extracts of Proceedings of the Geological Society.
, Publications of the Viking Society for Northern Research.
,, Reports of the National Trust.
LOS ANGELES—Publications of the University of California in Los Angeles.
LUND—Proceedings of the Royal Physiographic Society at Lund.
MADISON—Transactions of the Wisconsin Academy of Sciences, Arts and Letters.
MADRAS—Publications of the Government Museum, Madras.
,, Publications of the Madras Fisheries Department.
MALVERN—Annual Report of Malvern Field Club.
MANCHESTER—Journal of the Manchester Geographical Society.
MELBOURNE—Proceedings of the Royal Society of Victoria.
*MONTEVIDEA—Archivos Sociedad de Biologia de Montevidea.
MOSCOW—Bulletin de la Societe des Naturalistes de Moscow.
NEWCASTLE-UPON-TYNE—Proceedings of the University of Durham Philosophical Society.
*NEW HAVEN—Transactions of the Connecticut Academy of Arts and Sciences.
NEW YORK—Annals and Transactions of the New York Academy of Sciences.
* ,, Bulletins of the New York State Museum.
OSLO—Publications of the University Library, Oslo.
OTTAWA—Pubications of the Geological Survey of Canada, Department of Mines.
* ,, Publications of the Canadian Department of Agriculture.
OXFORD—Proceedings and Report of the Ashmolean Natural History Society.
PADOVA—Atti dell Accedemia Scientifica.
*PHILADELPHIA—Proceedings of the Academy of Natural Sciences of Philadelphia.
* ,, Proceedings of the American Philosophical Society.
POLSKA—Annales Panstwowe Museum Zoologiczne.
*PULLMAN—Research Studies of the State College of Washington.
RENNES—Bulletin Geologique et Mineralogique de Bretagne.
RIGA—Publications of the Latvijas Universitates, Riga.
,, Professor Strand, F.L.S.—Folia Zoologica et Hydrobiologica.
RIO DE JANEIRO—Archivos do Instituto de Biologia Vegetal.
,, Archivos Botanico do Rio de Janeiro.
,, Publications of the National Museums of Brazil.
,, Publications of the Oswaldo Cruz Institute.
ROCHESTER, N.Y.—Proceedings of the Rochester Academy of Science.
SAN DIEGO—Transactions of the San Diego Society of Natural History.
SAN FRANCISCO—Proceedings of the California Academy of Sciences.
*STILLWATER—Bulletins of the Oklahoma Agricultural and Mechanical College.
STILLWATER—Bulletins of the Oklahoma Agricultural and Mechanical College.

STIRLING—Transactions of the Stirling Natural History and Archaeological Society.
ST. LEONARDS-ON-SEA—Report of the Hastings and St. Leonards Natural History Society.
* ,, Hastings and East Essex Naturalist.
ST. LOUIS—Annual Report of the St. Louis Public Library.
*STRATFORD—The Essex Naturalist.
STRAVANGER—Publications of the Stravanger Museum.
SYDNEY—Annual Report of the Technological Museum, Sydney.
*TORONTO—Transactions and Proceedings of the Royal Canadian Institute.
*TORQUAY—Transactions and Proceedings of the Torquay Natural History Society.
UPSALA—Bulletin of the Geological Institution of the University of Upsala.
VIENNA—Verhandlungen Zoologisch-Botanischen Gesellschaft.
*WASHINGTON—Annual Report of the Smithsonian Institution.
* ,, Proceedings of the United States National Museum.
* ,, Smithsonian Institution, Miscellaneous Collections.
,, Publications of the United States Department of Agriculture.
,, Publications of the United States Geological Survey.
* ,, Bulletin of the Bureau of American Ethnology.
,, Contributed Technical Papers of the National Geographical Society.
WELSHPOOL—Publications of the Powys-land Club.
YORK—Annual Report of the Yorkshire Philosophical Society.
ZURICH—Publications of the Natural History Society of Zurich.

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PRESENTED
20 JUN 1946

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*I Bequeath out of such part of my personal Estate, as may by Law be bequeathed for such purposes to the Council of the Belfast Natural History and Philosophical Society, the sum of**

free from Legacy Duty, for the benefit of the Belfast Natural History and Philosophical Society, of the said City, to be expended in such way as it may deem expedient and I direct that the receipt of the Treasurer for the time being of the said Society shall be an effectual discharge of the said Legacy.

**Or Specimens of Art, Antiquities, or Natural History.*

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PRESENTED
26 JUN 1946